

File

Background of the Invention

5 The present invention concerns wall structures used with trampolines to protect trampoline users and to provide new uses for trampolines.

In the past, trampolines have been used for a variety of athletic and recreational purposes. However, injuries have sometimes resulted when a person jumping on a trampoline would land too near the boundary of the rebounding surface and strike the trampoline frame or fall off an elevated trampoline.

10 To reduce such injuries, devices have been made to form a wall around the perimeter of a trampoline bed so that when a jumper lands too near the edge, the wall prevents the jumper from falling off. For the most part, these devices have been passive walls which do not assist a jumper, except for providing basic protection, and which do not add anything to the experience of using a trampoline.  
15 Thus, there is a need for a trampoline enclosure system that does more than provide basic, wall-like protection.

Summary of the Invention

20 The present invention is a wall enclosure system which not only provides protection for a trampoline jumper, but also actively responds to an impact by urging the jumper back toward the center of the rebounding surface of the trampoline.

The present system has several unique structural features which make the wall active in response to an impact. These features also make the system easy to install and universally applicable to almost all types of trampolines. The construction of  
25 the present system also makes it possible to mount a variety of game accessories so that a jumper can use the trampoline for purposes not possible in the past. A variety of new games are made possible by these constructions.

30 These and other unique features of the invention will be understood with referenced to the following detailed description and drawings.

In the Drawings

Fig. 1 is an oblique view showing a trampoline apparatus including an enclosure system according to the present invention.

Fig. 2 is top plan view of the apparatus shown in Fig. 1.

5 Fig. 3 is an enlarged oblique view of a leg portion of the apparatus shown in Fig. 1.

Figs. 4, 4a are enlarged partial oblique views of a wall portion of the apparatus shown in Fig. 1.

Fig. 5 is an enlarged partial side view of the apparatus shown in Fig. 1.

10 Figs. 6, 6a are an enlarged views of an end cap shown in Fig. 5.

Fig. 6b illustrates a door structure.

Fig. 7, 7a are views of another trampoline apparatus including an enclosure system according to the present invention.

Fig. 8 is an oblique schematic view of the apparatus shown in Fig. 7.

15 Figs. 9-14 are views of various alternative constructions and accessories.

#### Detailed Description

Trampolines come in a variety of configurations and sizes. A popular trampoline is shown in Figs. 1-2. The illustrated trampoline has a circular frame 34 supported by multiple U-shaped tubular legs 36. The U-shaped legs have two  
20 vertically-extending sections 37 connected by a horizontal section which rests on the ground. The upper ends of the vertical leg sections 37 are secured to the frame 34 by welds. For ease in storage, it is convenient for the legs to be removable. This is made possible by providing a swage joint 38 in each vertical leg section 37. A plurality of spring members 39 tautly attach a sheet of sturdy fabric 40 to the frame  
25 34 so that the fabric provides a rebounding surface or bed. Other types of trampolines, having variations in structure such as individual legs secured by bolts or the like, will equally benefit from the present invention.

The trampoline is augmented by an enclosure system 30 which provides a protective and interactive environment for the trampoline user. The system 30  
30 includes a plurality of posts 44 which extend vertically. Each post 44 is secured to a vertical section 37 of one of the legs 36. For the purpose of this disclosure, each

post 44 is referred to as having an upper end portion 46, a full support portion 48 located above the level of the rebounding surface 40, a lower portion 50 located below the surface 40, and a lower end portion 52 which extends to ground level. These designations refer to locations on a post 44, not to separable sections. In the illustrated embodiment, each post 44 is made in two sections and connected at a swage joint 54, with the two pieces secured together by a set screw. A single-piece post could also be used, or a post comprised of more than two pieces secured end-to-end with swage fittings and set screws. A multi-piece post is easier to package and ship than a unitary post.

Each post is connected to a leg by two leg fasteners 58, 60. As best seen in Fig. 3, the upper fastener 58 is an assembly having two U-bolts 64. The U-bolts have threaded ends 65. In use, the U-bolts are positioned to encompass the frame 34 on opposite sides of the vertically extending portion 37 of a leg 36. Two saddle clamps 66 are respectively positioned above and below the frame 34. Each clamp 66 has two openings which respectively receive one threaded end 65 of each of the two U-bolts. Nuts 68 are tightened onto the threaded ends 65 of the U-bolts 64 in order to secure the post 44 to the frame 34. To provide a degree of flexibility in the fasteners 58, stiff compression springs (not shown) could be provided between the saddle clamps 66 and nuts 68. In this arrangement, locking nuts would be used, and the nuts would not be tightened to that extent that the springs were completely crushed. With such springs in place, a post 44 could be moved a short distance away from the frame 34 when a person bounced against the post from inside the chamber 106. The additional movement of the pole would help cushion the impact on the person.

A rigid, smooth-surfaced cap 82 is provided on the outside of each upper fastener 58 to cover all the threaded ends 65 of the U-bolts. The caps 82 protect persons from coming into contact with the threaded ends 65 of the U-bolts 64, which ends are somewhat sharp. Each cap 82 has rounded corners and is secured in place over the ends 65 by a cable tie (not shown) which encompasses the cap and a diameter of the frame 34 and/or leg segment 37.

The lower fastener 60 has a single U-bolt 74 with threaded ends 75. A saddle clamp 76 is positioned over the threaded ends and held in place by nuts 78. For greatest stability, the lower fastener 60 should be near the bottom of the vertical section 37 of the leg 36 so that the lower fastener 60 is well below the upper fastener 58. For safety, the lower fasteners should be positioned so that the threaded ends of the U-bolts 74 extend inwardly, toward the center of the trampoline bed 40.

It is particularly helpful for the fasteners 58, 60 to be positioned so that all swage joints 38 are located between the upper and lower fasteners 58, 60. This arrangement will prevent the swage fittings from coming apart unintentionally, as is possible during energetic use of a trampoline for game playing. It is also an advantage of this system that it reinforces the legs of the trampoline and reduces the stresses on the welds between the frame 34 and legs sections 37. Although not preferred for general use, other fastener systems can be employed as described below.

The wall support portion 48 of each post 44 is covered with a layer 84 of padding made from a resilient foam material, with or without a fabric cover. The padding may be a rectangular sheet wrapped around the post 44 and secured by fasteners or may be tubular so that there is no seam. The illustrated foam is extruded closed cell polyethylene foam. Other resilient, weather-resistant foam materials could also be used. As explained below, the foam material serves not only as cushioning for a person who impacts one of the posts 44. The foam material is used as a part of a system for momentarily storing energy from remote impacts, so that portions of foam help rebound a person toward the center of the trampoline, even when the foam is not directly impacted by the person.

In the illustrated embodiment, an end cap 86 is provided as an upper extension of each post 44. The end cap has a rounded upper portion 88, a centrally-located neck portion 90 which is a circumference channel extending around the axis A of the post 44, and a downwardly-opening collar portion 91 which is located at the base of the cap and which is of greater inside and outside diameter than the neck portion 90. The upper portion 88 is substantially spherical for strength. The neck portion 90 is

hollow and sized to snugly fit over the upper end portion of a post 44. The collar portion 91 is of sufficient inside diameter to receive, protect, and aid in securing the top of the padding layer 84. The cap 86 is made of a shatter-proof plastic material which is somewhat flexible at typical ambient temperatures so that the cap is capable of cushioning some impact energy.

A hook 92 is provided by an eye bolt which has a passageway 93 giving access to the center of the eye. In the illustrated embodiment, the hook is located on the end cap 86, but could be located elsewhere at or near the upper end portion 46 of the post 44. The eye bolt has a shank which extends through two vertically-aligned, registered holes through the post 44 and cap 86 at one side of the post 44. The threaded end of the shank is secured by a tee nut 94 which has a neck received in suitably-sized, registered holes through the post 44 and cap 86 at the opposite side of the post 44. Other forms of hook could be used at this location, and a hook could be secured differently, for example by one or more clevis pins extending both through a portion of the hook and through the post. A closed eye could also be used, but this would be less convenient because lines would need to be threaded through eyes during installation of a wall. The hook has several uses explained below.

A generally cylindrical wall 100 of a flexible material is suspended between the posts 44 to define a chamber 106 above the rebounding surface 40. The illustrated chamber is open at the top as shown in Fig. 1. The wall 100 has top and bottom edges 101, 102 and is made of a light-weight plastic sheet material, such as extruded plastic safety fencing, which has a unitary structure with numerous mesh-like openings 104. Woven netting, strong fabric, or other forms of plastic mesh may also be used, preferably with the top and bottom edges 101, 102 being reinforced by a hem or other finishing. Generally, the wall material will be a rectangular piece having a width which is the same as the height of the wall, and a length which is somewhat longer than the circumference of the enclosure. The openings should be no more than 2 inches across, in their largest dimensions, to prevent small children from getting their hands stuck in the openings and so that there is a sufficiently uniform-surface against which balls of most any size can be thrown during game play. Preferably the openings will be at least 1 1/2 inches

across and spaced sufficiently closely that there is good visibility through the wall 100. The fencing may take many forms; the most common have patterns of openings that are diamond-shaped or rectangular. The most preferred for the wall 100 is a pattern of diamond-shaped openings spaced at 1 3/4 inches node-to-node.

- 5 The fabric of the wall 100 and the other nonmetal elements described herein are best made of materials which are abrasion-resistant and which are resistant to weathering, e.g. by exposure to UV light. Suitable materials, include polypropylene, nylon, high density polyethylene, and Dacron polyester.

- 10 A support system is provided to hold the wall 100 in place. At the top, a flexible line 108 extends post-to-post near the top of the chamber 102. For each pair of adjacent posts 44, the posts are connected by a reach of the line 108. In the illustrated embodiment the line 108, although flexible, is only somewhat elastic. The line 108 thus allows the tops of the poles to move relative to one another, but the tops of two adjacent poles can not move away from each other to any great
- 15 extent. The line 108 is made of a sturdy, weather-resistant material such as 1" nylon webbing. Nylon webbing is best suited because it has little elasticity and thus will not sag after it is installed. Webbing is better than rope for the line 108 since rope has a relatively low surface area which would tend to cut into and abrade the body of a person who bounced into contact with the line 108. Webbing has a relatively high
- 20 surface area and automatically rotates so that a flat face of the webbing contacts any impacting body. The flat webbing face distributes resistive force over a greater portion of a person's body and is relatively nonabrasive.

- The illustrated top line 108 is a single continuous piece. The ends of the top line 108 are secured together by a buckle 110 so that the top line is a continuous
- 25 loop. This is a strong construction since the buckle 110 is the only fitting connected to the line. Tension in the line 108 can adjusted by using the buckle 110 to vary the circumference of the loop. The line 108 is mounted to chokingly surround the neck portion 90 of each end cap 86. As shown in Figs. 4 and 5, this is accomplished by slipping a loop 116 of the line 108 through a metal ring 114, and then lowering the
- 30 loop 116 over the top 88 of the end cap 86 to a position where the loop 116 seats in the trough of the hook 92 and extends through the neck portion 90. After the line

108 is thus secured on all the end caps and pulled to a desired tension, each ring 118 maintains its loop 116 at a small diameter so that the loop 116 can not slide up out of the neck portion 90. The ring 114 is a welded steel chain link having inside dimensions of 1" x 3/8" and having rounded edges to minimize wear of the line 108 and to protect trampoline users from injury.

The wall 100 is secured to the upper line 108 along portions of the line 108 which extends between the post 44. The wall 100 can be secured to the line 108 in a variety of ways. When using mesh-like plastic safety fence, which has numerous openings 104, it is most convenient to weave the upper line 108 through a series of openings 104 near the top edge 101 of the wall 100. This arrangement is shown in Fig. 5. With a wall 100 of plastic safety fencing material, the top line 108 is woven through each opening along the top edge 101. The weaving can skip a few openings 104 opposite each of the end caps 88 to reduce stresses at points where the top line 108 extends from the fencing to a post 44.

A similar arrangement is used to secure the bottom edge 102 of the wall 100. A strap of one inch polypropylene webbing 120 extends post-to-post at an elevation near that of the frame 34. A reach of the webbing 120 thus extends between each pair of adjacent posts 44. The webbing additionally can be secured to the frame 34 at intervals between the posts 44, by cable ties (not shown) or other fasteners, to prevent the wall from stretching to a position outwardly of the frame 34. Alternatively, the webbing 120 can be secured to the trampoline bed at the inner ends of the springs 39 which support the fabric 40 or could be secured to the annular pad (not shown) which is commonly provided over the springs. The ends of the webbing 120 are secured together by a buckle 121 so that the webbing 120 is a continuous loop.. Tension in the webbing 120 can be adjusted by using the buckle 121 to vary the circumference of the loop. The webbing 120 is connected to the base of the wall 100. With a wall of plastic safety fencing, the webbing 120 is woven through a series of openings 104 near the bottom edge 102 of the wall material. At each post 44, a loop 122 of the webbing 120 extends out of the wall 100 and is held to the post 44 by a fastener 124 such as a cable tie. The fastener should be mounted so that the loop 122 cannot move a substantial distance upwardly

along the post. A loop 122 should not extend from two immediately adjacent openings in fencing material, since this would stress the fabric near the post.

Instead, some space should be allowed between the two points where the loop 122 extends from the wall 100, so that tensioned webbing 120 does not cut into the wall 100 at those points. As an alternative, the bottom edge of the fencing 100 could be secured directly to the frame 34 by a series of cable ties (not shown), without use of webbing 120. Connectors from the frame to the bottom strap can be threaded through openings pierced through perimeter padding 126.

A particularly useful feature of this invention is a securing system which holds intermediate portions of the wall 100 to the posts 44. As best seen in Fig. 5, an elastic cord 128, of the type sometimes referred to as a bungee cord or shock cord, is secured at each end so that it extends vertically along the wall support portion 48 of a post 44. In the illustrated embodiment, one end of the cord 128 has a loop received in the trough of the hook 92 near the top of the post 44 and, at its other end, has a loop connected to the lower leg fastener 58. Between its ends, the cord 128 extends in serpentine fashion through openings 104 in the wall material so that loops of the cord 128 are alternately provided on the inside and the outside of the wall 100. Outside loops 130 of each cord are aligned with one of the posts 44. Also extending along the wall support portion 48 of each post 44 is a helical wrap of webbing 134. In the illustrated embodiment, this webbing is a length of one half inch polypropylene webbing with a loop 135 at its top end. The bottom end is secured to the fastener 58, while the top loop 135 is supported on the hook 92. The strapping 134 extends helically around the outside of the padding 84 and through loops 130 to hold the cord 128 against the padding 84. The strap 134 is wrapped sufficiently tightly to hold the cord 128 against the padding 84, but not so tightly that the padding is completely crushed.

Because the wall material 100 is longer than the circumference of the enclosure, ends portions 137, 138 of the wall fabric overlap as shown in FIG. 6B. At the top, the end portions 137, 138 are secured by weaving of the line 108 through openings 104 at the top edge of the end portions. A horizontal row of openings at the tops of the two end portions 137, 138 are held with the openings in registry, and



the line 108 threaded through adjacent openings in the , in serpentine fashion, so that the top edges of the end portions 137, 138 are in effect sewn together by the top line 108. At the bottom, the outer end portion 138 is secured by weaving of the line 120 through openings 104 at the bottom edge of the end portion. The bottom of the inner end portion 137 is not secured. A piece of 1/2" nylon webbing 139 is woven in serpentine fashion downwardly from the top line 108 through both the end portions 137, 138 to a location 140 between the top and bottom lines 108, 120. This webbing 139 thus sews upper regions of the end portions together. The nylon webbing continues down from the location 140 secured only to the inner end portion 137. Thus the end portions 137, 138 are not sewn together below the location 140, thus providing a flap door 141 which may be bent inwardly to permit access to the chamber 106. A free extension 142 of the webbing 139 can extend from the bottom of the inner end portion 137 to be used for tying down the bottom of the door. In the illustrated embodiment, the extension is secured by wrapping it around the bottom line 120 at the base of the door and then tying it to a removed area of the bottom line 120.

The illustrated enclosure system has walls which are strong but highly resilient. The fabric of the wall 100 is extruded plastic safety fencing which is flexible, but only somewhat elastic. Elasticity is provided by other elements. In particular, the cord 128 is elastic, the padding 84 is comprised of a plastic foam material which compressible and elastic, and the posts 44 are flexible.

When a person jumps from the trampoline surface 40 and hits the wall 100 of the enclosure, the wall moves a short distance in the direction of the force applied by the user and thereby absorbs energy and cushions the shock. All of the posts 44, because they are linked together at the top by the top line 108, flex toward the impacted portion of the wall panel. Cord loops 130 are stretched on those posts 44 which are near the region of impact. And, those loops 130 pull and tension the associated strapping 134 into the padding 84 so that the padding compresses. These actions allow the fence 100 to flex and conform to the body of the person who impacted the fence. The conformance of the fence distributes the resistive force on the person's body to provide enhance cushioning. Also, because of this arrangement

of elements, a portion of the impact energy is stored in the fixed posts 44, in the elongated cords 130, and in the crushed padding 84. This stored energy is promptly released as a force which urges the impacted portion of the wall back towards the center of the chamber 106, pushing the trampoline user with it.

5 To provide elasticity in this system, the posts 44 should not be rigid. The posts should be sufficiently strong that impacts by trampoline users will not permanently bend the poles. But, the posts 44 should be able to flex to some extent when a trampoline user impacts the wall 100. For ease of construction and low cost, the illustrated posts 44 are made of tubular steel. Other materials, such as pvc  
10 plastic, fiberglass and carbon fiber, can be used if they have appropriate strength and flexibility characteristics. As mentioned above, the strapping 134 should not be applied so tightly that it completely crushes the padding 84. And, the padding 84 should be made using a resilient foam. It is a further advantage of this securement system that the elasticity of the loops 130 helps to prevent the wall fabric from  
15 ripping.

As most clearly seen in Fig. 7, it is useful to provide cross-bracing straps 144 to limit the movement of adjacent posts toward or away from another. A preferred cross-bracing material is substantially inelastic nylon webbing; plastic or metal cable could also be used. The cross-bracing extends, in pairs of crossing reaches, from  
20 positions near the upper end portions 46 of two adjacent posts 44 to positions which are near the elevation of the frame 34, so that an X-shaped pair of straps extend between each pair of adjacent posts 44. The cross-bracing for a pair of adjacent posts 44 can be provided by a single length of strapping which extends in a partial figure-eight pattern among four rings including a top ring 148 and a bottom 149 on  
25 each post. The two ends of the strap 144 are secured by a buckle 152.

It is possible to tune the flexibility of various elements of the enclosure system. This can be done by adding or removing one or more sections of flexible cord, or other type of spring, to a run of inelastic strapping. For example, tension springs, such as shock cord segments, could be added to the line 108, the strap 120,  
30 the strapping 134, and/or the cross bracing 144. The addition of a short section of flexible cord imparts a small amount of elasticity to such members. For greatest

5 The embodiment shown in Figs. 7 and 8 is similar to the embodiment shown in Figs. 1-6, except that the enclosure system has fewer posts 44. Instead of being mounted on every vertical trampoline leg section 37, one post 44 is mounted on every other vertical leg section 37. This illustrates that the number of posts 44 and where they are mounted will depend on the size of the trampoline and the number of  
10 its legs, and the preferences of the trampoline owner. But, using the same basic set of parts, an enclosure kit can be assembled for trampolines of almost every size and shape.

A variety of new games have been developed to make use of the features of the enclosure system of the present invention. These games in some instances employ accessories to the basic enclosure system, as described below.

5 Tramp Chase. Players start in diagonal quadrants. At least two cords are stretched across a court, and hoops or other obstacles may be attached to them. Someone says go, and the players race around in the same direction, either over or under each of the cords, which the players have determined. Player wins by catching to and tagging his opponent.

10 Tramp Ball. Players are on either side of the net stretched across the court. Net is placed higher for more challenge. Ball is soft Nerf-type about the same size as a soccer ball. Players throw or hit it over the net. If opponent misses the ball and hits the back most panel of the court a point is scored. Opponent has one bounce of his ball on the trampoline or less to catch ball and throw or hit it back to the other side.

15 Tramp Shot. Two bungee cords stretched across the court, one high and one low, suspend a target. The target consists of three disks which may rotate. A small, soft, bouncy Nerf-type ball about 4 inches minimum is used. Players may move anywhere in the court. A player serves by hitting the ball at the target, if it misses, the opponent gets a point and the serve.

20 Tramp Back. Players start anywhere in the court. Target is a large (3' diameter) plastic disk mounted securely against one pole. Ball is small, soft, and bouncy but lightweight, pneumatic-type plastic ball, about 4 inches in diameter. Players may move around in the court. One serve is by hitting or throwing the ball against the target. Opponent has one bounce of the ball against the trampoline to catch the ball, and may only take one step before throwing the ball back at the target.

25 Tramp Scotch. Many cords are criss-crossed across the court at the same or varying heights. Players must jump over one square to another in a player-determined sequence. For more challenge, players may not touch any of the cords when making the jumps.

30 Tramp Pass. Two circular targets (3' in diameter) are securely attached to opposing poles in the court. Each is covered with Velcro covered the hook side of

Velcro fastener. A small, soft, medium-weight ball is covered with Velcro loop fastener. A cord along the surface of the tramp separates the two players. Players throw the ball at the opponent's target. The opponent tries to block or catch the ball. A point is scored if the ball sticks to the target. Once the opponent has the ball, he can throw the ball at the other target. For more challenge use more balls.

Tramp Tag. Three to eight balls of varying or equal size and bounciness are used. Players bounce about the court in any direction. They start with 10 balls losing one each time a ball touches them. The last player left with a ball wins. Once a player is out he leaves the court. For more challenge, use elastic cords stretched across the court obstacles.

Tramp Basket. A cord is stretched across the court at below waist height. A small basket with a net is securely attached to one pole. A soft, bouncy Nerf-type ball that can easily pass through the net is used. Players either take turns a predetermined number of times and the one with the most baskets wins or a half-court game can be played. In the half-court game, the player on offense shoots behind the cord. The player on defense may not goal tend.

Tether Tramp I. The ball is suspended from above the court by a bungee cord. A cord also extends from the top cord down to a cord across the bottom. The ball is a medium-sized, bouncy, light-weight, plastic ball. Each player is in one-half of the court as marked by the lower cord, and remains there the entire game. A player wins by hitting the ball until it wraps tightly and completely around the vertical cord suspended in the center of the court.

Tramp Duel. Two nets are securely attached to poles located across from one another. One cord runs across the court at below waist-height, dividing the court into two halves, with the nets at the back of each. The ball is medium-sized and soft. Each player remains in his half during the entire game. Points are scored when a player makes a basket. The defender may block a shot, but may not goal-tend.

High Tramp. A cord is stretched across the net, starting out at waist height. Just like the High Jump, each player attempts to jump over the cord from one side to the other, without touching the cord. Each player gets three attempts to jump each

height. If both succeed, the cord is raised. The player to make the greatest height wins.

5 Tether Tramp II. Similarly to Tether Tramp I, the ball is attached to a cord which is suspended from an overhead cord. The object is to throw the ball around the horizontal cord. Each player tries to wrap up the ball in opposite directions.

Tramp Touch. A cord is stretched across the court. From it, balls are hung at graduated heights. This allows small children the challenge of jumping up and hitting them at progressively greater heights. They can see if they really did touch or not because the ball will be swinging. For greater challenge with larger kids, 10 hang the balls from the upper part of the TrampBrella poles.

Tramp Throw. Cords are stretched in a grid across the top of the court. Game is played by jumping up through a certain square and throwing the ball down through another specific square.

15 Tramp Slide Each player attempts to slide one of two soft "buoys" across to the other side of the net. If it hits the other side without the opponent blocking it, the player scores a point. For additional challenge, a cord separating the two buoys for both players can be added. This requires the players to jump over the cord to get between the two buoys.

20 Tramp Hook. Each player has a different colored set of "hooks." The grid at the top of the court is divided into different sections, and they score by putting their hooks in their color-coded spot for each section. Each player is in a separate section, and they rotate when one completes his section.

25 Tramp Jump. An ordinary garden hose is attached to a water-pressure driven motor suspended in the center of the court. Attached to the motor is a soft rubber foam rod with a soft-weight at one end. The motor turns the foam rod around the court, and the exiting water splashes around the court. Players avoid the foam rod by jumping or ducking. Its height may be varied.

30 Speed Ball. Two players have two different colored sets of balls, and a matching colored basket. They race to grab balls of their color (only one may be carried at a time) out of the center basket and put it into their own. Variations can

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Having herein described preferred embodiments of the invention, it is anticipated that suitable modifications and additions may be made thereto within the scope of the invention.

For example, there are alternative methods for securing the top line 108 to the posts 44. As shown in FIG. 8, the line 108 can be wrapped around the neck 90 which will keep the line in place without use of a ring.

The attachment of the wall to the posts could be different. Although not preferred, the wall fabric could be attached to the posts with cable ties. Or, as shown in FIG. 9, the wall could be secured directly to the wall with a helical wrap, without an intermediate cord such as bungee cord 128.

Suitable wall-support posts could be mounted so that they extend upwardly from a trampoline frame, and do not extend to the ground. A bracket for this purpose is shown in FIG. 10. With this system, a trampoline support leg is received in the downwardly-facing opening \_\_, the trampoline frame is received in the horizontally-facing openings \_\_, \_\_, and the wall support post is received in the upwardly-facing opening \_\_. The bracket can be designed to receive free ends of four separate tubing members as illustrated. Or, a passage way could be provided through the bracket, horizontally and/or vertically, so that the bracket could be secured at a location between the free ends of a tube. For example, if the bracket has a vertical passageway, a single tube could extend through the passageway and, if the tube is sufficiently long, be used for both the trampoline leg and the wall support post. Likewise, if there is a horizontal passageway, the bracket could be secured to a frame segment at a location between the ends of the segment. The bracket shown in FIG. 10 is made of two sheet metal members which bolt together to sandwich tube members therebetween. Other suitable brackets, as shown in FIGs. 11-12, are a metal cross connectors of the type used in plumbing joints.

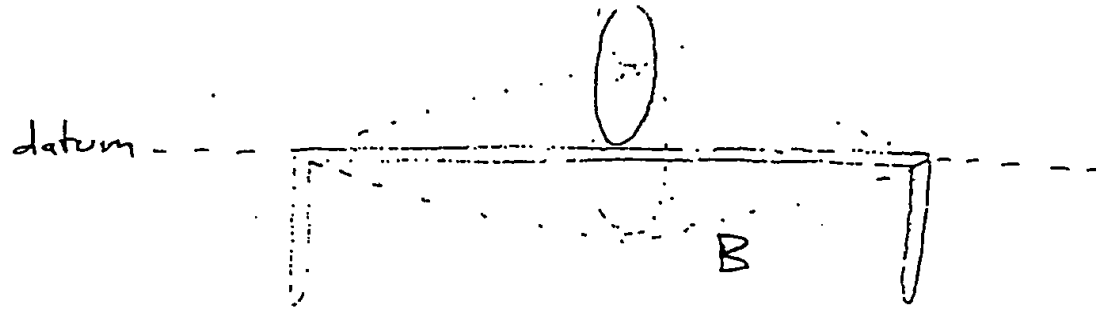
An activity computer could be provided to process data acquired from sensors, of the type shown in FIGS. 13-14, attached to the trampoline and enclosure system. The computer could be linked to a keypad or other user input device. Such a computer would use the inputted information, such as time intervals between



# Trampoline Court Specification Sheet

Category	Part Description	Dimensions	Amount	Specifications
Webbing	1" Nylon, Yellow, cut, Type 25 (upper)	45"	1	4500 lb. tensile breaking strength
	1" Polypropylene, Yellow, cut, Type 800 (lower)	45"	1	1100 lb. tensile breaking strength
	1/2" Polypropylene, Red, cut, Type 408	11"	9	375 lb. tensile breaking strength
	1/2" Polypropylene, Red, cut, Type 406	3"	8	375 lb. tensile breaking strength
Shock Cord	1/4" Shock cord	7'	7	180 lb. tensile breaking strength
Steel Tubing	Upper Support Tube, 1 3/4" O.D., 16 ga., galvanized	3'	8	Cold rolled, 1008-1010 steel
	Lower Support Tube, 1 3/4" O.D., 16 ga., galvanized	6'	8	Cold rolled, 1008-1010 steel
Netting	Co-axial polypropylene fence, 1 1/2" x 2" mesh size	45" x 8'	1	130 lb. tensile breaking strength
Foam Tubing	Expanded polyethylene foam, 5/8" wall, 1.75" I.D.	6'	8	Closed cell, extruded, 2 lb. density
Misc Hardware	Ball End Caps, 90 Durometer, Polyvinyl Chloride (PVC)	2.75" x 2.125" x 1"	8	Made by dipping process
	U-bolt Cover Caps, 90 Durometer, Polyvinyl Chloride (PVC)	3.125" x 2.75" x 1.371"	8	Made by dipping process
	Self-lapping sheet metal screw	#12 x 5/8"	8	
	Eye Bolt, 5/16-18 w/ Zinc, C1018	1.825"	8	
	Tee Nut, 5/16-18 (prongless)	0.375"	8	
	Welded chain link (individual)	1" x 3/8"	12	
	Welded chain link (2 links)	1" x 5/8"	7	
Clamps/Saddles	D-ring	1"	2	580 lb. tensile breaking strength
	Locking buckle	1"	1	360 lb. tensile breaking strength
	Saddle clamp	1.75" I.D.	24	
U-Bolts	Cust. Lower U-Bolt, 5/16"	4.125" X 2.08"	8	
	Cust. Upper U-Bolt, 5/16"	4.375" X 2.37"	8	
Nuts	Nylock Nut, 5/16-18		48	

Energy Absorption Factor of Panels: 0.50 to 0.95 (50% to 95% of impact energy is absorbed)  
Spring Rate of Support Poles: 5 lb/in to 45 lb/in (a measure of the stiffness of the poles)



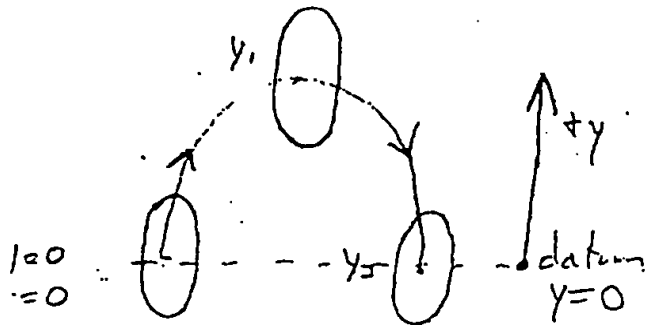
The motion of bouncing on a trampoline is divided by two distinct phases. Phase A occurs while moving up into the air and is described by projectile motion. Phase B occurs while rebounding on the bed of the trampoline and is described by standing wave mechanics. The two phases are marked by the trampoline bed (or the bottom of the user's feet) passing the datum line located at the position of the bed at rest.

The energy added to the system can be calculated by taking the difference in the potential energies (height of the jumps) or the kinetic energies (velocities while passing the datum) of a bounce and its preceding bounce and adding energy lost in damping.

Calories burned is a function of both the total energy output to the system, and the body's ability to convert nutritional calories into energy.

# Part A - Projectile Motion

PAGE 31



Assumptions:

- Newtonian mechanics (ie. non-relativistic equations, since velocities are much less than  $0.3c$ )
- Air drag on the body is neglected
- Vertical motion only

Variables:

$y$  = vertical position relative to datum  
 $t$  = time, starting at  $t=0$  when user's feet travel upward from the datum  
 $v$  = velocity  
 $t_0, t_1$  = total time in the air  
 $a$  = acceleration

Constants

$g = 32.2 \text{ ft/sec}^2 \approx 9.81 \text{ m/sec}^2$   
 (acceleration of gravity)  
 $c$  = speed of light

$$y(t) = y_0 + v_0 t + \frac{1}{2} a t^2$$

$$y(t) = 0 + v_0 t + \frac{1}{2} g t^2$$

$$y(t) = v_0 t + \frac{1}{2} g t^2$$

$$v(t) = v_0 + g t$$

$$v_0 = v - g t$$

$$t_0: v = v_0$$

$$t_1: v = -v_0$$

Equations:

$$y(t) = y_0 + v_0 t + \frac{1}{2} a t^2$$

$$\text{at } t_1: v = 0$$

$$0 = v_0 + g t$$

$$t = \frac{-v_0}{g}$$

$$y = v_0 \left( \frac{-v_0}{g} \right) + \frac{1}{2} g \left( \frac{-v_0}{g} \right)^2$$

$$y = \frac{-v_0^2}{g} + \frac{v_0^2}{2g} = \frac{-v_0^2}{2g}$$

$$\text{at } t_2: y = 0$$

$$g t^2 + v_0 t - y = 0$$

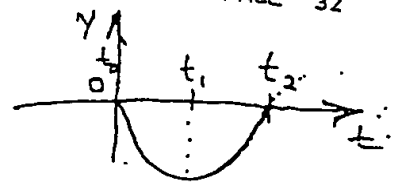
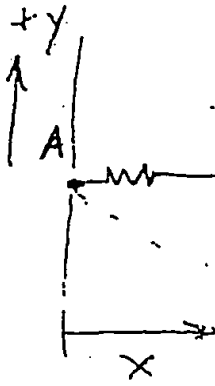
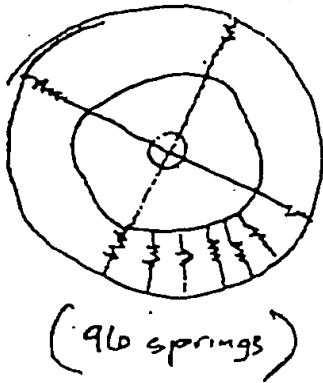
$$t = \frac{-v_0 \pm \sqrt{v_0^2 - 4g(-y)}}{2g}$$

$$t = \frac{-v_0 \pm \sqrt{v_0^2}}{2g}$$

$$t_1 = \frac{-v_0 + v_0}{2g} = \frac{-v_0}{g} \text{ or } \cancel{0}$$

$$\Delta t_A: t_1 - t_0 = \frac{-v_0}{g} - 0 = \frac{-v_0}{g}$$

$$\begin{aligned} g t^2 + v_0 t &= 0 \\ t(g t + v_0) &= 0 \\ t=0 \text{ or } t_1 \end{aligned}$$

Part B - standing wave mechanicsVariables

- $x$ : horizontal position  
 $y$ : vertical position  
 $\omega$ : angular velocity (rad)  
 $f$ : frequency  
 $T$ : period  
 $\lambda$ : wavelength  
 $\mu$ : mass per unit length  
 $F$ : vertical force  
 $L$ : length of string  
 $M$ : mass of user (m) + mass of bed  
 $\Delta t_B = t_2 - t_1$

Equations:

$$\omega = 2\pi f$$

$$T = 1/f = 2\pi/\omega$$

$$v = \lambda f = \lambda/T$$

$$v = \sqrt{\frac{F}{\mu}}$$

$$f_n = n \frac{v}{2L} = n f_1 \quad (n = 1, 2, 3, \dots)$$

$$f_1 = \frac{1}{2L} \sqrt{\frac{F}{\mu}}$$

$$f = \frac{1}{2L} \sqrt{\frac{F}{\mu}}$$

$$\mu = \frac{M}{L}$$

$$f = \frac{1}{2L} \sqrt{\frac{FL}{M}}$$

$$t_2 - t_1 = 1/2 T$$

$$\Delta t = T/2 = 1/2f$$

$$\Delta t = \frac{1}{2} \left( \frac{2L}{f} \sqrt{\frac{M}{FL}} \right)$$

$$\Delta t_B = L \sqrt{\frac{M}{FL}} = \sqrt{\frac{ML^2}{FL}} = \sqrt{\frac{ML}{F}}$$

$$\Delta t_{\text{Tot}} = \Delta t_A + \Delta t_B$$

$$\Delta t_{\text{Tot}} = -\frac{V_0}{g} + \sqrt{\frac{M \cdot L}{F}}$$

$$V_0 = g \left( \sqrt{\frac{M \cdot L}{F}} - \Delta t_{\text{Tot}} \right)$$

Kinetic energy  $KE = \frac{1}{2} m v_0^2$

Energy added to system  $\Delta E = KE_2 - KE_1$

$$\Delta E = \frac{1}{2} m v_{0,2}^2 - \frac{1}{2} m v_{0,1}^2 = \frac{1}{2} m (v_{0,2}^2 - v_{0,1}^2)$$

$$\Delta E = \frac{1}{2} m \left[ \left( g \left( \sqrt{\frac{M \cdot L}{F}} - \Delta t_{\text{Tot},2} \right) \right)^2 - \left( g \left( \sqrt{\frac{M \cdot L}{F}} - \Delta t_{\text{Tot},1} \right) \right)^2 \right]$$

$$\Delta E = \frac{1}{2} m g^2 \left[ \left( \sqrt{\frac{M \cdot L}{F}} - \Delta t_{\text{Tot},2} \right)^2 - \left( \sqrt{\frac{M \cdot L}{F}} - \Delta t_{\text{Tot},1} \right)^2 \right]$$

### Calories Burned

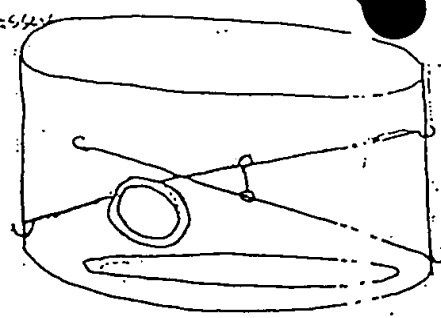
Approx conversion rate for humans  $C = 0.20 = 20\%$

$$\Delta E = (\text{Calories})(C)$$

$$\text{Calories} = \frac{\Delta E}{C} = 5 \cdot \Delta E$$

## Tramp Chase - Donald Strasser

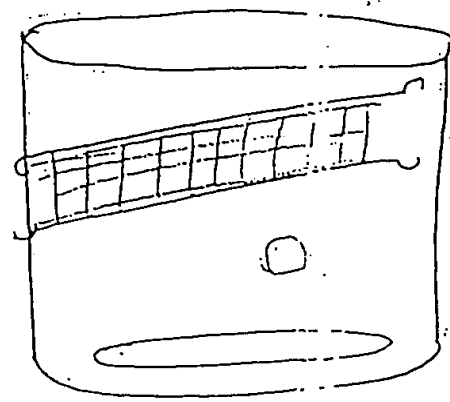
- Players start in diagonal quadrants. At least two cords are stretched across court, and hoops or other obstacles may be attached to them.



- Someone says go, and the players race around in the same direction, either over or under each of the cords, which the players have determined. Player wins by catching to and tagging his opp.

## Tramp Ball - Gemic

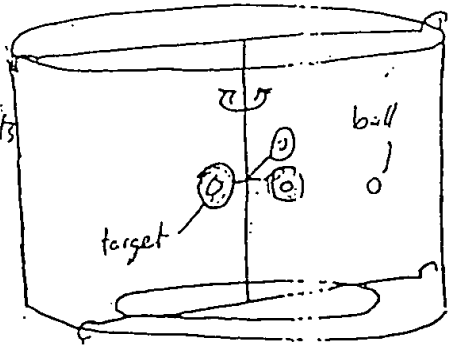
- Players are on either side of net stretched across the court. Net is placed higher for more challenge. Ball is soft Nerf-type about the same size as a soccer ball.



Players throw or hit over the net. If opp misses ball and hits back must pass of the a point is scored. Opp has one bounce of his on the trampoline or less catch ball and throw or it back to the other

## Tramp Shot - Donald Strasser

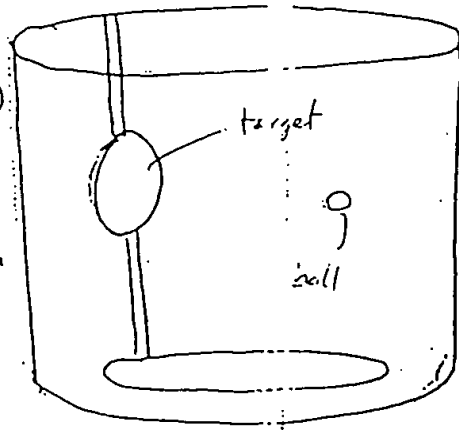
- Bungee cords stretched across the court, one high and one low, suspend the "target". Target consists of three disks which may rotate. Small, soft, bouncy Nerf-type ball about 4 in dia is used.



- Players may move anywhere in court. serves by hitting ball at the target, missed the opponent go point and the serve. ball hits, the opponent 2 or three bounces of ball on the trampoline the ball and throw it to the target

## Tramp Back - Donald Strasser

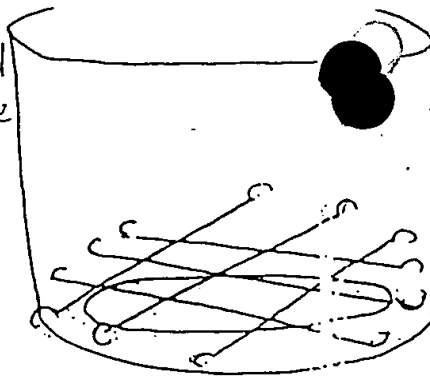
- Players start anywhere in the court. Target is a large (3' dia) plastic disk mounted securely against one pole. Ball is small, soft, and bouncy but lightweight pneumatic-type plastic ball, about 4 in dia.



- Players may move anywhere in the court. One serves by hitting or throwing the ball against the Opponent has one of the ball against trampoline to catch ball, and may only one step before the net the tar

## Tramp

- Many cords are strung across the court at the same or varying heights

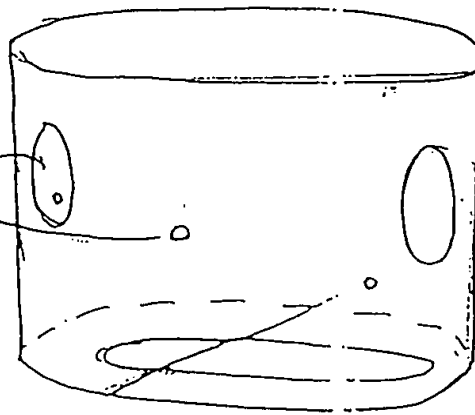


- Players must jump one square to another a player-determined
- For more challenge, may not touch any cords when making jumps

## Tramp Pass

- Mark Publimer

- 2 circular targets, (3' in dia) are securely attached to opposing poles in the court. Each is covered with the hook side of Velcro fastener.
- A small, soft, <sup>medium</sup> weight ball is covered with Velcro loop fastener. A cord along the surface of the tramp separates the two players.

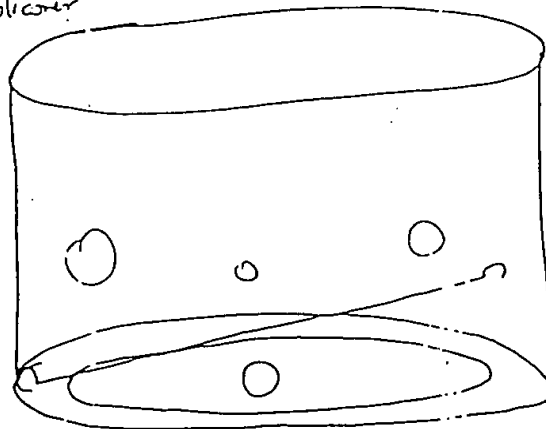


- Players throw the ball at the opponent's target. The opponent tries to block or catch the ball. A point is scored if the ball sticks to the target.
- the opponent has the ball he can throw the ball at the other target
- more challenge use balls

## Tramp Tag

- Jacob Publimer

- 3 to 8 balls of varying or equal size and bounciness are used

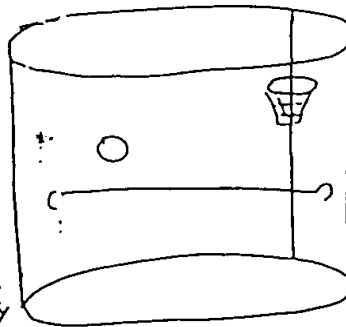


- Players bounce the ball in any direction. They start with 1 ball. The first player to lose one each time a ball touches then last player left wins. Once a player is out he leaves the court. For more challenge, use a cord stretched across the court.

## Tramp Basket

- Donald Stosser

- A cord is stretched across the court at below waist height. A small basket with a net is securely attached to one pole. A soft, bouncy net type ball that can easily pass through the net is used

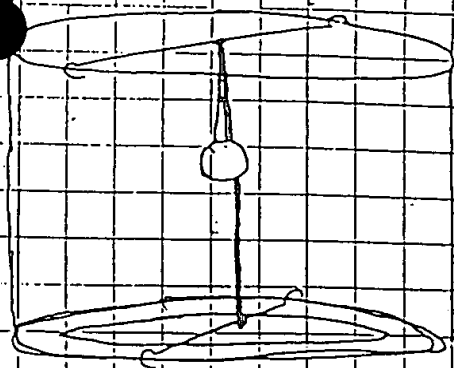


- Players either take turns or a predetermined number of times and the one with most baskets wins. A half court game can be played. In the half court game, player on offense shoot behind the cord. The player on defense may not fend.

## Lether Trap I

- Donald Strasser  
- Mark Publicover

The ball is suspended from above the court by a bungee cord. A cord also extends from the top cord down to a cord across the bottom. The ball is a medium sized, bouncy, light weight plastic ball.

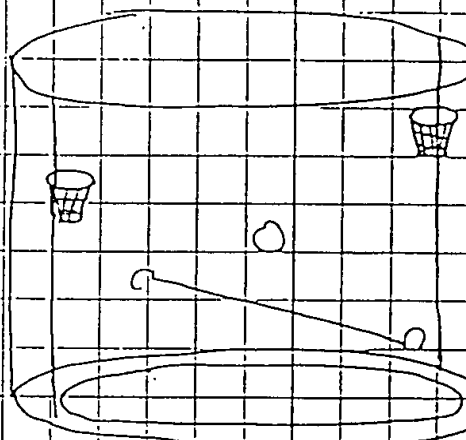


Each player is in one half of the court as marked by the lower cord, and remains there the entire game. A player wins by hitting the ball until it wraps tightly and completely around the vertical cord suspended in the center of the court.

## Tramp Duel

- Mark Publicover

Two nets are securely attached to poles located across from one another. One cord runs across the court at below waist height dividing the court into two halves with the nets at the back of each. The ball is medium sized and soft.



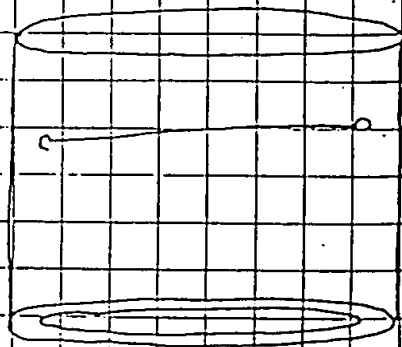
Each player remains in his half during the entire game. Points are scored when a player makes a basket. The defender may block a shot, but may not go all in.

## High Tramp

- Donald Strasser

A cord is stretch across the net, starting out at waist height.

Just like the high jump, each player attempts to jump over the cord from one side to the other without touching the cord. Each player gets three attempts to jump each height. If both succeed, the cord is raised. The player to make the greatest height wins.

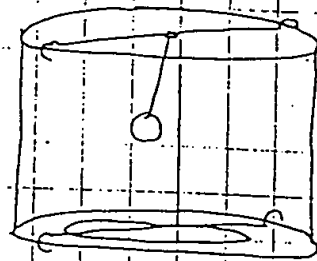




## Letter Tramp II

- Mark Publicover

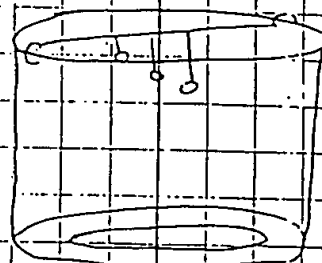
Similarly to Letter Tramp I, the ball is attached to a cord which is suspended from an overhead cord. The object is to throw the ball around the horizontal cord. Each player tries to wrap up the ball in opposite directions.



## Tramp Touch

- Donald Strasser

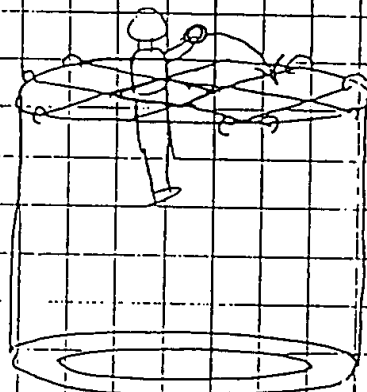
A cord is stretched across the court. From it, balls are hung at graduated heights. This allows small children the challenge of jumping up at hitting them at progressively greater heights. They can see if they really did touch or not because the ball will be swinging. For greater challenge with larger kids, hang the balls from the upper part of the tramprella pole.



## Tramp Throw

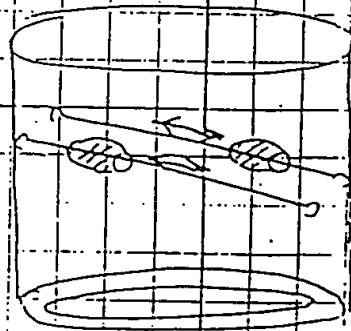
- Mark Publicover

Cords are stretched in a grid across the top of the court. Game is played by jumping up through a certain square and throwing the ball down through another specific square.



## Tramp Slide - Mark Publicover

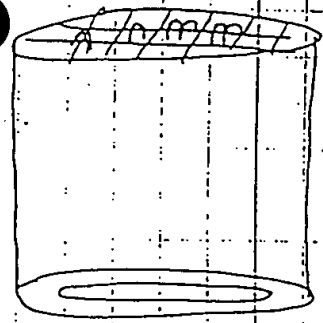
Each player attempts to slide one of two split "buoys" across to the other side of the net. If it hits the other side without the opponent blocking it, the player scores a point. For additional challenge, a cord separating the two buoys for both players can be added. This requires the players to jump over the cord to get between the two buoys.



## Tramp Hook - Mark Publisher

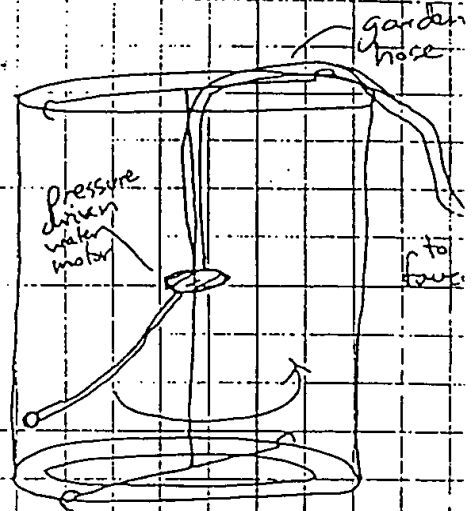
(19)

Each player has a different colored set of "hooks". The grid at the top of the cart is divided into different sections, and they score by putting their hooks in their color coded spot for each section. Each player is in a separate section, and they rotate when one completes his section.



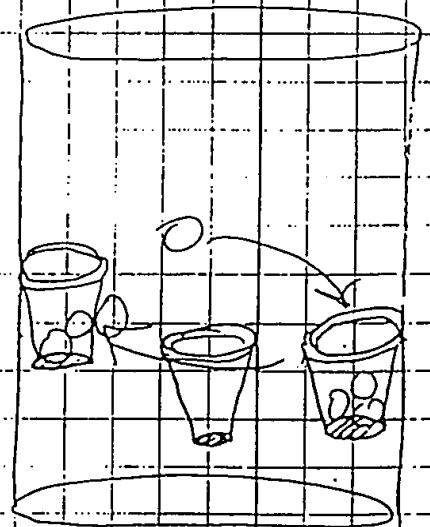
## Tramp Jump - Mark Publisher

An ordinary garden hose is attached to a water pressure driven motor suspended in the center of the cart. Attached to the motor is a soft rubber foam rod with a soft weight at one end. The motor turns the foam rod around the cart, and the exiting water splashes around the cart. Players avoid the foam rod by jumping or ducking. Its height may be varied.



## Speed Ball - Mark Publisher

2 Players have 2 different colored sets of balls, and a matching colored basket. They race to grab balls of their color (only one may be carried at a time) out of the center basket and put it into their own. Variations can be played with no center basket, or with players stealing or blocking each others balls.



Entry completed

on a strasser

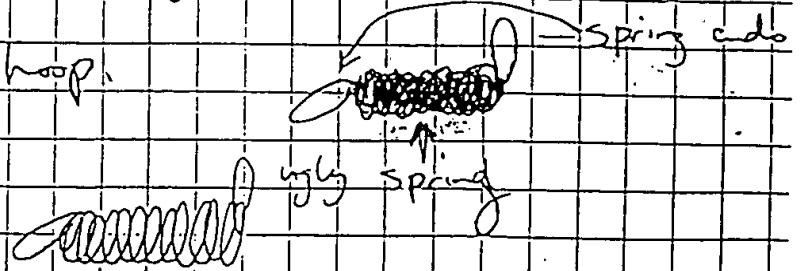
[illegible]

## Names (Continued)

Hip Hoop - Conceived of around a month ago, this game calls for one hoop, or a number of hoops attached to the participants' ~~per~~ hip. The participant bounces on the trampoline, causing a ball to bounce off of the bed.

The participant must jump & move to score the ball through the hoop. For two players, the hoop/hoops are attached at the waist & the player try to shoot (using hands) the ball into their opponent's hoop(s).

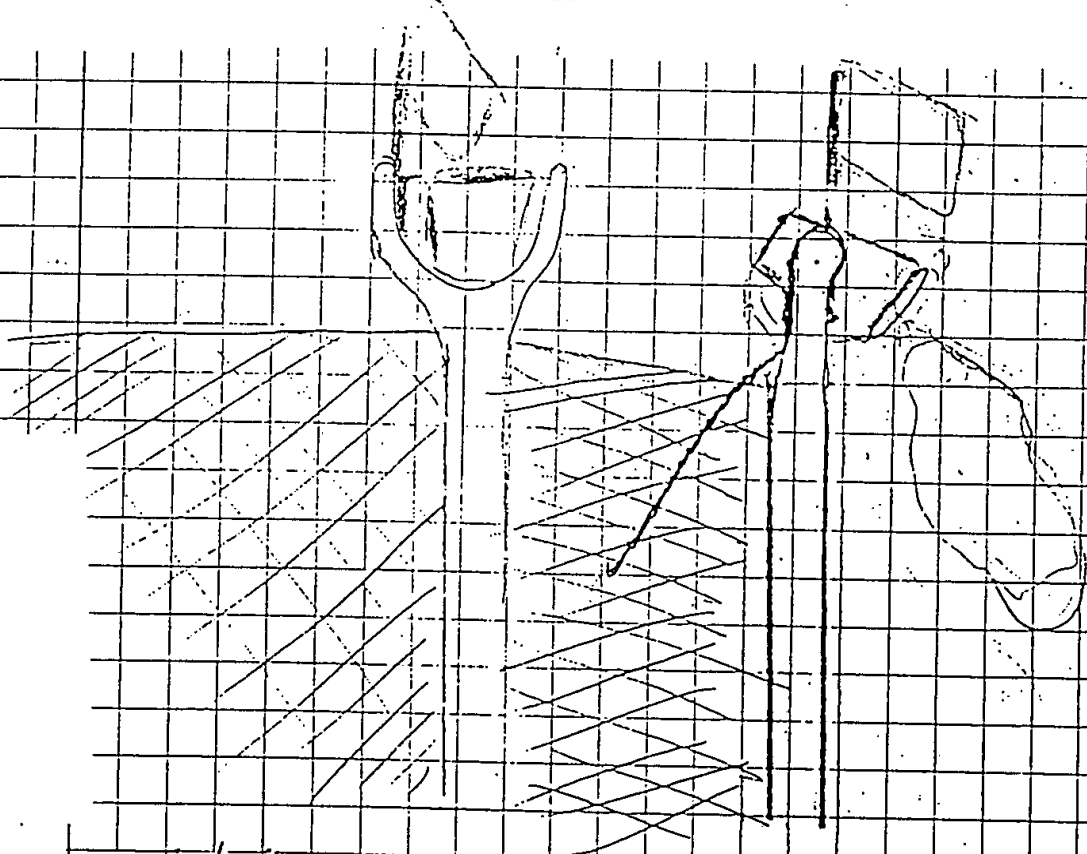
Wave Hoop - A hoop was made out of plastic would be attached to the jumpcount post. The hoop would be durable and ~~then~~ be spring loaded so that it will spring back to its standard/normal position after being hit (Spring-loaded breakaway hoop system). Sp. would be internal and ~~be~~ run horizontally through the hoop.



#2)

Castle Siege

Castle Siege- The player on the trampoline is defending his or her castle from attack. His weapons are buckets on each post (a.k.a. Castle Caldrons) filled with water that he can capsize onto the players outside if they get too close. Participants on the outside are trying to "seige the castle" by knocking the castle flag from where it hangs proudly using bean bags/foam balls. The individual who captures the castle then becomes King or Queen. The current "King" must block/capture the beanbags, and if he secures them all, the game ends (and he or she will continue to reign). It takes bravery -but watch out, if the King/Queen hits you with water, you are put into the dungeon until the kingdom falls. One way tool that the "seigers" have are sheilds to defend them from the water. Bungipulps (a.k.a flingerthingers) may be used by participants outside, sending in water projectiles (water balloons) or by the King/ Queen to weaken the attacks of his/ her enemies.



Variation(s) Flags are mounted to each post, and the Kingdom is claimed only when all of the flags are knocked down. The flags are velcroed to each flag post so that they may be attached

easily also so that only the material falls.

Operation: In the place of flags, a small net pocket made of netting would be the target mounted over each "Castle Chidron". When each pocket contains a bean bag or splash ball, the Kingdom would be successfully conquered.

Design/Configuration: A small bucket is mounted to each post, (secured on two sides to a "Y" that runs that is mounted to the post so that it may pivot). The bucket has a cord secured to the outside portion of the bucket. When pulled the bucket tips outward, ejecting the water contained in it.

Water is fed to the buckets from a single garden hose attached to a ~~piece of pipe~~ "splitter". Tubes are attached to the splitter.

Soakerball (or spongeball)- Players on the outside could dunk foam balls into a water bath, and send it in to the JumpCourt.

### Cord Games

Orbital Jump Rope- Rope will either be adjustable in lengths for single/ multiple play, and can be attached to the JumpCourt posts

Bungi cords are attached in a gridlike fashion to the top of the JumpCourt posts. The individuals on the outside have bungi bouncers (with hooks) that they are sending into the the JumpCourt, and gain certain points for entering the different holes.\*

Cord tag- A cord is attached to one JumpCourt post, the other side is secured to a cord running perpendicularly which has ends that participants on the outside can pull back in forth. The cord attached to the post can move (and may have a ball attached to it) ; the object of the game is to tag the person on the inside with the cord while he/she is jumping to avoid it. Once tagged, the players switch.

High High Jump.- Player can adjust the height of the obstacle they must jump over.

Mirror, Mirror- Two players play this game at one time, one is the "person," and the other is the "mirror." The tramp Court is divided into quarters (or sixths, or eighths) using jump cords. Every good mirror gives a perfect reflection.... if the person jumps right, so must the mirror; if the person does a one-eighty, so must his or her mirror; if the person pulls a 360 to cord straddle, so must the mirror. This is a game you are actually trying to "break your mirror." Three breaks, and its your turn to be the mirror.

One hoop is suspended in the center <sup>net</sup> in a bag/attached to it. Players bounce around on beds to bounce the ball into the hoop without using their body directly. Hoop is raised for greater challenge.

A variation on this game would be to have players inside defending the goal, while players on the outside make shots. The participant on the outside earns points by successfully putting the ball through the hoop (perhaps only if the player on the inside does not catch the ball before it hits the ground).

Ball is used with a hoop that is just slightly larger. The net or bag beneath the hoop does not allow the ball completely through. This increases the challenge and the demand for accuracy.

Variation: One player is in the Timpland and other players are outside with ball (preferably pneumatic). The player on the inside must ~~give~~ complete one trip "around the world," jumping through each section without touching the cord. ~~and jumping~~ After the player makes the trip "round the world," he must finish the game by jumping into the hoop. Meanwhile, the players on the outside must shoot a ball into the hoop before the inside player has finished the game.



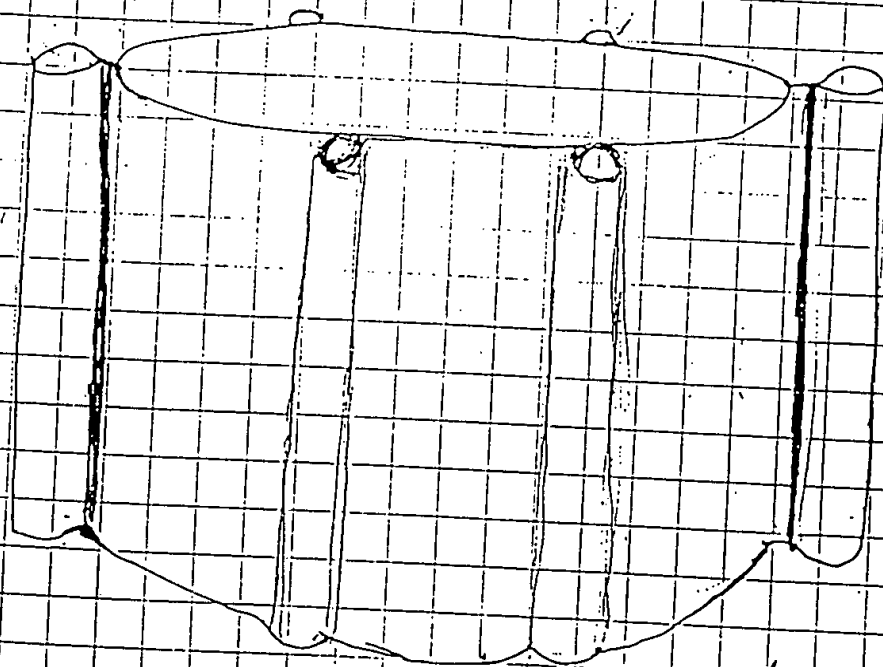
Knit fabric

Post configuration:

PVC or other flexible tubing could be used in conjunction with ~~the~~ steel post,

placing the pvc tubing on top of the steel posts, or making every other post alternate between the <sup>two</sup> same materials. (e.g. steel post/pvc post/steel post/pvc post)

Utilized design: Softer Springs/bed, better padding, etc.) Safety fence.



Fence is made out of woven fabric, <sup>nylon,</sup> <sup>polyester</sup> (polypropylene / polyethylene) folded and ~~stitched~~ ~~sewn~~ sewn down the width (vertically) to be slipped over the posts to anchor it in place.

Webbing is sewn to folded fabric for

Strength. Fabric Spacing

exists between cant perimeter

and post sleeve so

that: 1) Impact into post

is reduced by having

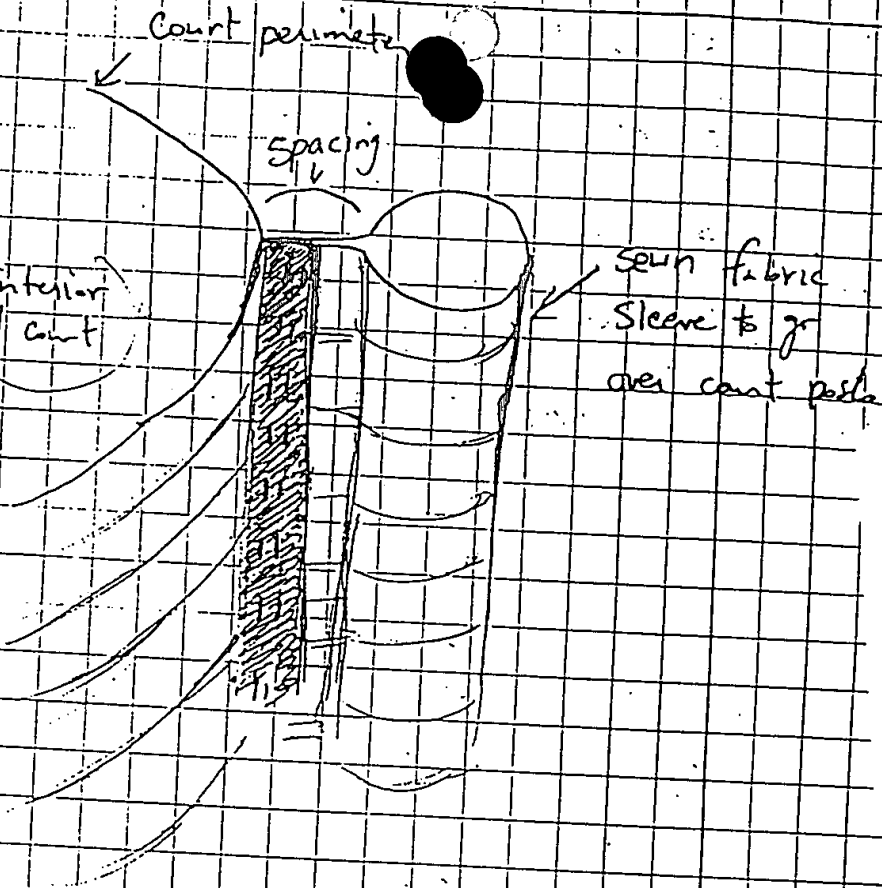
inside perimeter separated

from posts. 2) Cant

perimeter would equal

the perimeter of the trampoline bed so that cant

would ~~not~~ protect individual from the frame & or springs.



### Door Configuration

This arrangement

for the door is devised

to make access easy

but to discourage

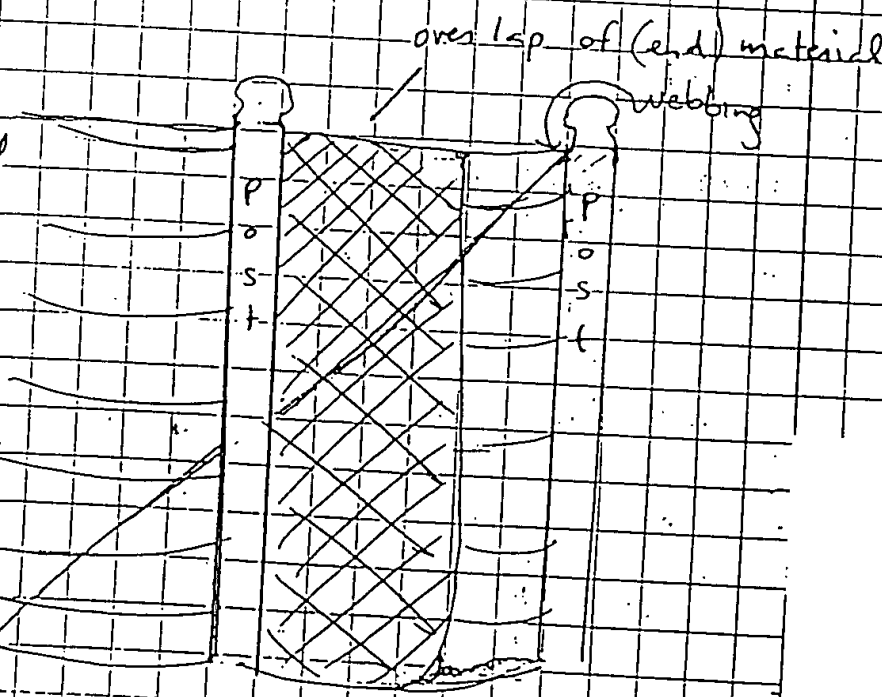
prevent an individual

from falling at even

if they don't look

the door closed the

way they should.



- 1) Door overlaps; one end is secured to post; second end terminates within the first door.

~~XXXX~~ Dump Toner  
Around 15/97 Donald Crossen built

a working prototype of the Jumpmeter which we have failed to include ~~until~~ <sup>until</sup> this point. Currently he has added phase #3 to the device which is ~~XXXX~~ a second switch for games using a target and a variety of settings for different elements. Phase #2 was attaching sound capabilities to the device. Currently the device has been tested and has the following qualities/capabilities:

- Counts bounces on the trampoline bed; (over the entire bed, and is quite responsive) record them on a digital display
- has a reset button + on/off switch
- has a second switch that records hits on a target
- has switches to select noises and which switches

it is ~~now~~ monitoring (it can record bounces on the bed + hits on the target simultaneously or independently)

- it will have a count down + a ~~noise~~ device to trigger a noise on a random bounce/hit.

This device can be used for measuring aerobic + calorie burning activities as well as being utilized in many ways for games.

Securing net/fence to the bed/frame reviewed  
& revision discussed.

We have conceived and tested a number  
ways to secure the netting to the frame or:

1) Cable ties attached to net; and string thru  
(punctured) pads, then wrapped round the frame

(Strapping: elastic  
or non-elastic)

2) Strapping (webbing) ~~wrapped~~ ~~not~~ as worn thru netting  
and string thru (punctured) pad & wrapped around  
frame.

3) Cable ties wrapped thru fence, around outside of  
frame and secured to spring

4) Strapping around netting & around frame, without puncturing  
padding

5) Grommets attached to padding that strap or  
cable tie could be string through, using method  
#1-2-3 (in place of grommets, clips on page 31 could be employed)

6) Grommets attached to padding, cord is string through  
it, ~~to~~ ~~not~~ string through net, and pulled  
tight (in place of grommets, clips on page 31 could be employed)

7) Same as # six, but under wrapped around the frame  
(cord is)

8) Same as # six, except cord is not wrapped  
thru net. Instead, hooks are used like those  
on page 30 to secure the net to the frame

9) Hook found on page 32 could be attached to  
frame, and cable tie/cord/strapping could be  
secured to it in place of the frame for use utilizing  
methods 1-8.

1) Netting could be secured to movable  
(inside of the padding or ring) using elastic/non-elastic  
cord/strapping.

1) Netting could be slid under padding, and connected  
to movable bed (padding could be secured to frame, or the net)

2) Additional padding could be secured to the  
frame, using tape or strapping or cord or velcro  
for protection & in the event that the pad is moved,  
and secured by method ~~EX #1~~ #1-#11. The  
padding that came with the trampoline could be  
tied to the frame as normal or to (which tends  
to pop) or attached to the net so that it  
can move with the impacting body.

3) Before hanging the net up, connect the net  
to the springs by either a) taking each spring  
off, & re-attaching it putting it through the mesh  
on the edge (with the bulk of the material above)  
and re-attaching it or b) taking each spring off,  
feeding each spring through a mesh on the edge (with  
the bulk of the material below) and wrapping  
the bulk of the material around the outside of the frame  
(taking off each leg and re-inserting it between a mesh) &  
and hanging it to the post.

## Post / padding / webbing / net configuration

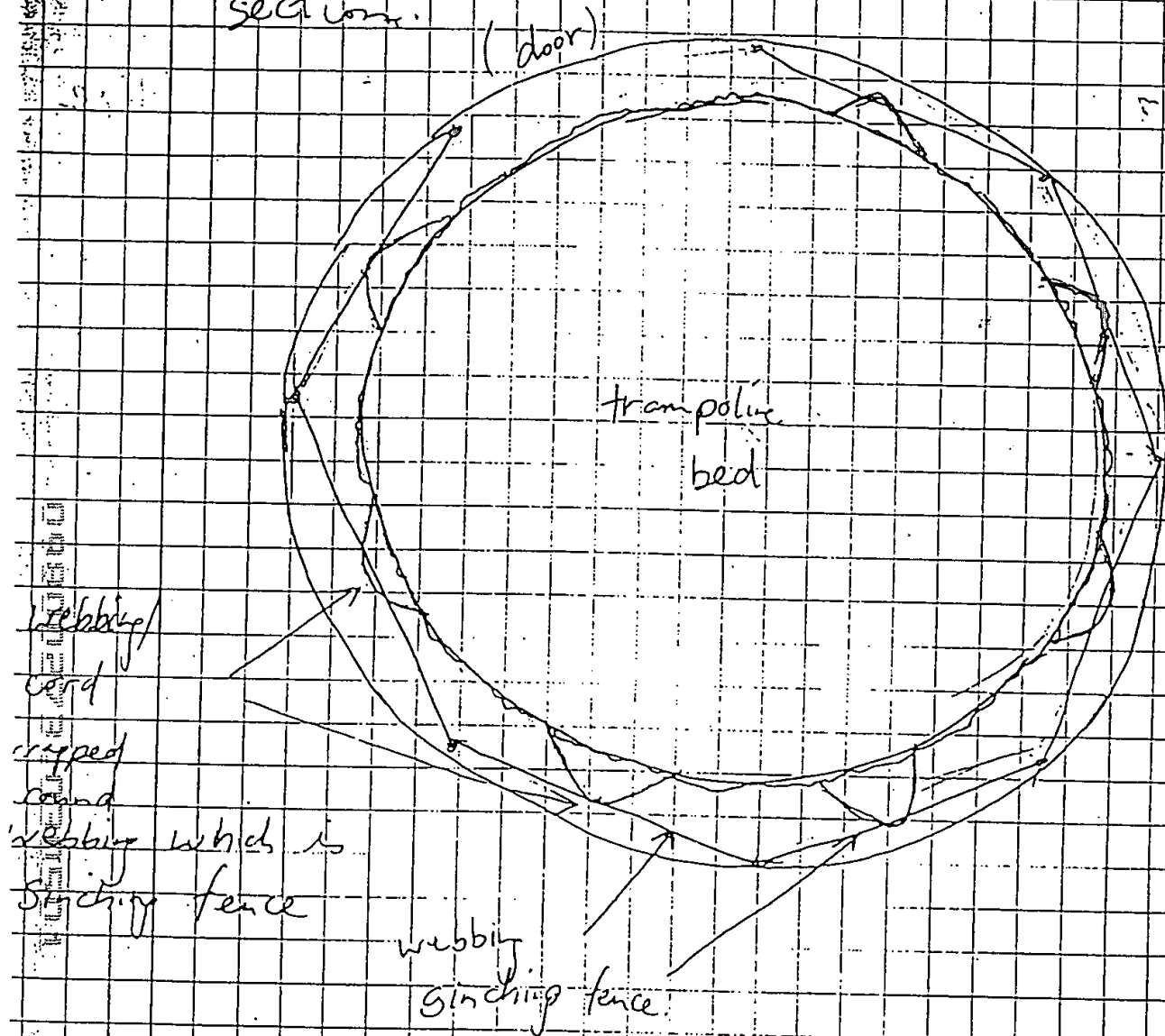
Recap: Padding is stretched over the post, and elastic or non-elastic cord/webbing is wrapped around the post and through the net in a descending, spiral fashion. The padding not only absorbs energy from a direct impact to the post, but also helps to absorb energy from an impact into the net. The webbing/cord, spiralling around the post, has more surface area than would cable tie, and therefore helps to distribute weight better. In conjunction with the foam, this attachment of netting to the posts acts to absorb the impact efficiently. The posts, being semi-flexible also work not only to absorb the force of an impact, but also act to rebound the body toward the center of the trampoline.

may be the fence material we are leaning toward in our court design or any type of fabric that will perform well outdoors, like those on pg 44).

Securing the bottom edge of the net: ramification #14) a ramification alluded to in ramification #6 on page 52 is to have ~~an~~ elastic/non-elastic webbing/cord woven through bottom of net, (cords would probably need to be made in the fence at the posts) and fence drops below the frame of the trampoline and is stretched tightly.

#15) elastic/non-elastic cord is woven through bottom edge and secured to the frame at the posts (~~probably~~ ~~probably~~ one end is probably connected to one post, while the other end is tied to the seventh post ~~and~~ the cord/webbing is pulled tight, for seven sides of an octagon inside of the & the trampoline. Elastic/non elastic cord/webbing

is secur to the web and the  
trampoline bed in at least one <sup>place</sup> between each  
section.



Ramification to webbing/cord configuration found on  
page 6.

Have webbing/cord woven vertically  
through let at posto. Use the "Candy strip"  
(spiral) configuration, attach the webbing/cord  
to the vertical webbing/strapping.  
This design distribute the weight of an



The arrangement could be a variety of combinations

Vertical Weave	Webbing	Webbing	bungee	bungee
Spiral Candy Stripe (or "O" ring)	Webbing	bungee	Webbing	bungee

↑  
 (O) rings could be used in place of Candy  
 configuration.

Purpose: Same as Trampbrella II

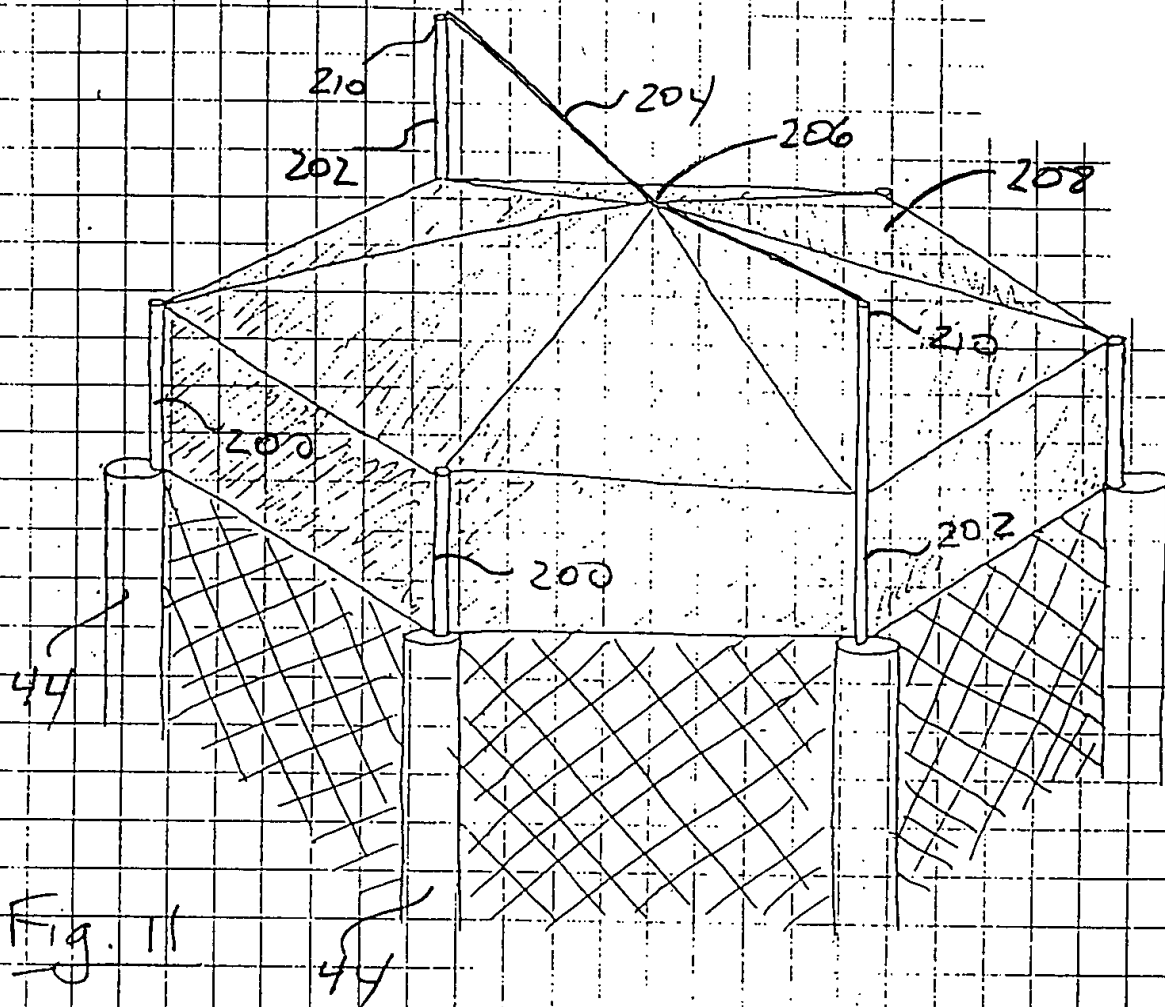


Fig. II

Description: Short (about 3 ft) poles are attached to all but two of the tramp court support tubes. Two long poles (about 5 ft) are attached to the remaining tubes. A line runs between the two tall poles and is attached to the covering. The covering runs down to and is attached to the top of each of the small poles.

Construction: PVC plastic, or fiberglass for the poles. Netting, Canvas, tent, or awning plastic for the covering.

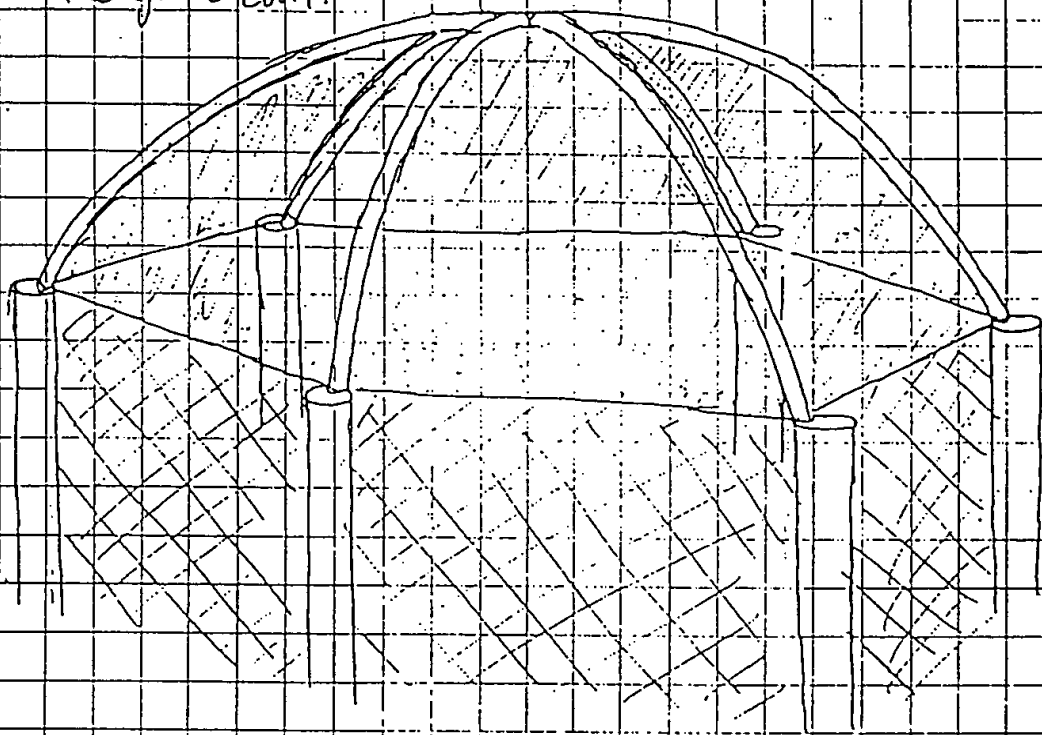
Advantages: The court is completely enclosed. The covering is raised to a height where it doesn't restrict jumping anywhere within the court.

# Tramp Brella

Design

Purpose: To provide shade, shelter, and sun protection over the top of a trampoline equipped with the tramp court. It may also be used to attach overhead games, (such as Tramp Touch). It <sup>also</sup> contains balls, for use with the game court.

Design:  
Donald Stras  
Drawn:  
Donald Stras



Description: Tent type poles are attached from the top of each vertical support tube and go to either an attachment piece at the center (as shown above) or all the way across to the opposite support tube (overlapping at the center). The design for the 6 support tube model is shown above. A covering is stretched between the poles.

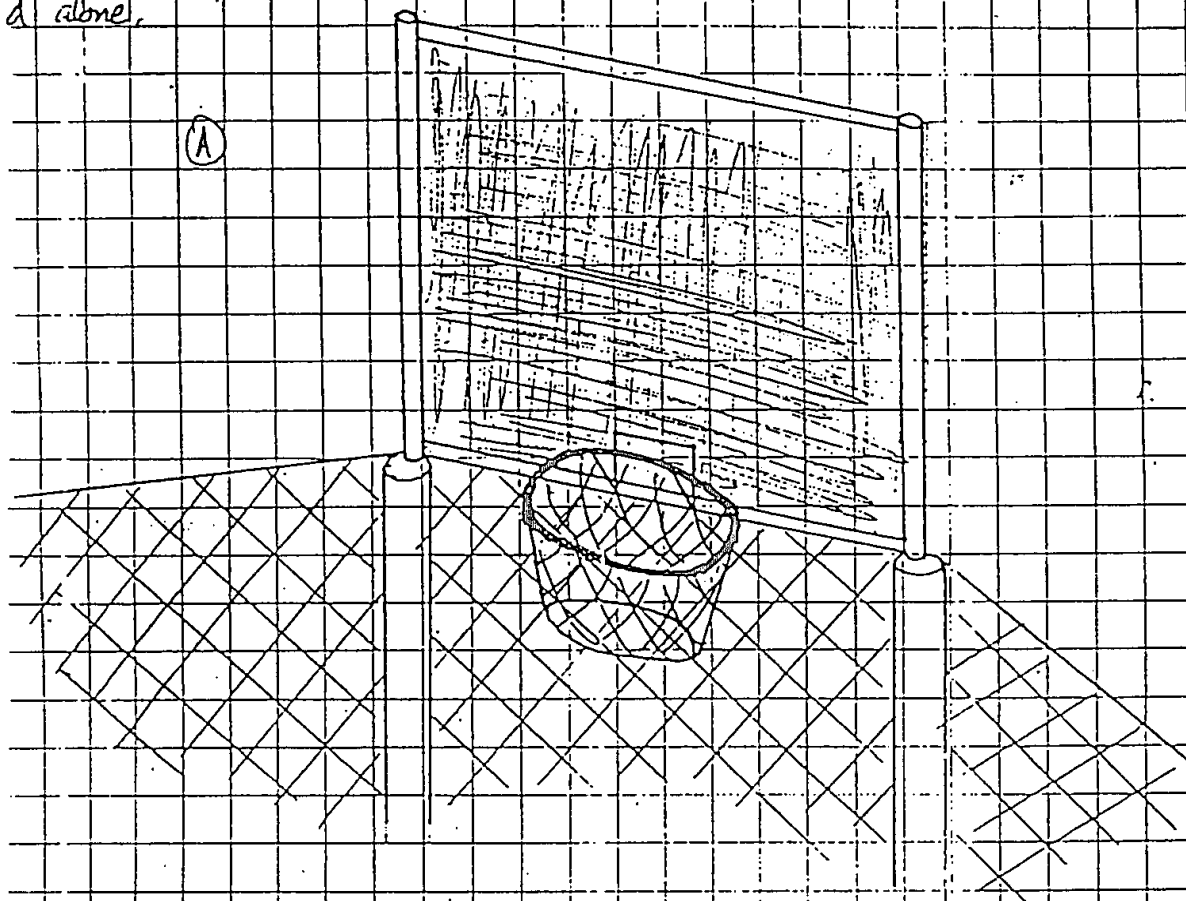
Advantages: Aesthetics - the design is simple, clean, and fits well with the tramp court configuration. Because of the curved supports, maximum overhead clearance is achieved in the center of the trampoline, where it is most needed. The frame is strong enough to support lightweight game attachments.

Construction: Either fiberglass or aluminum tent-type poles for the supports with <sup>Netting</sup> canvas, tent plastic, or awning plastic type covering.

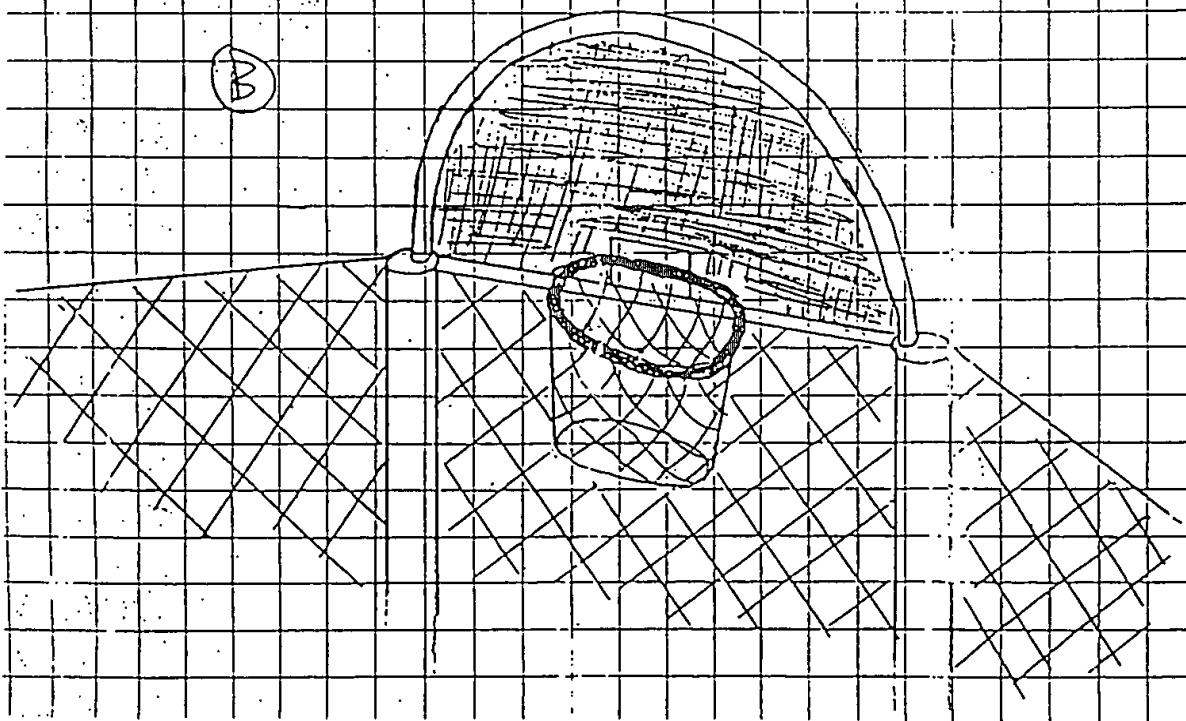
The purpose is to provide a back board and a skerball-type hoop and net which attaches to the port poles of the Tramp Court. The back board is a sturdy, weather resistant plastic or finished wood. Integral, separate type supports are located around the outer edges, shown in versions A & B. The hoop can be disconnected so that it not interfere with jumping and so that the back board can be alone.

Drawn:  
Donald Strassen

(A)



(B)

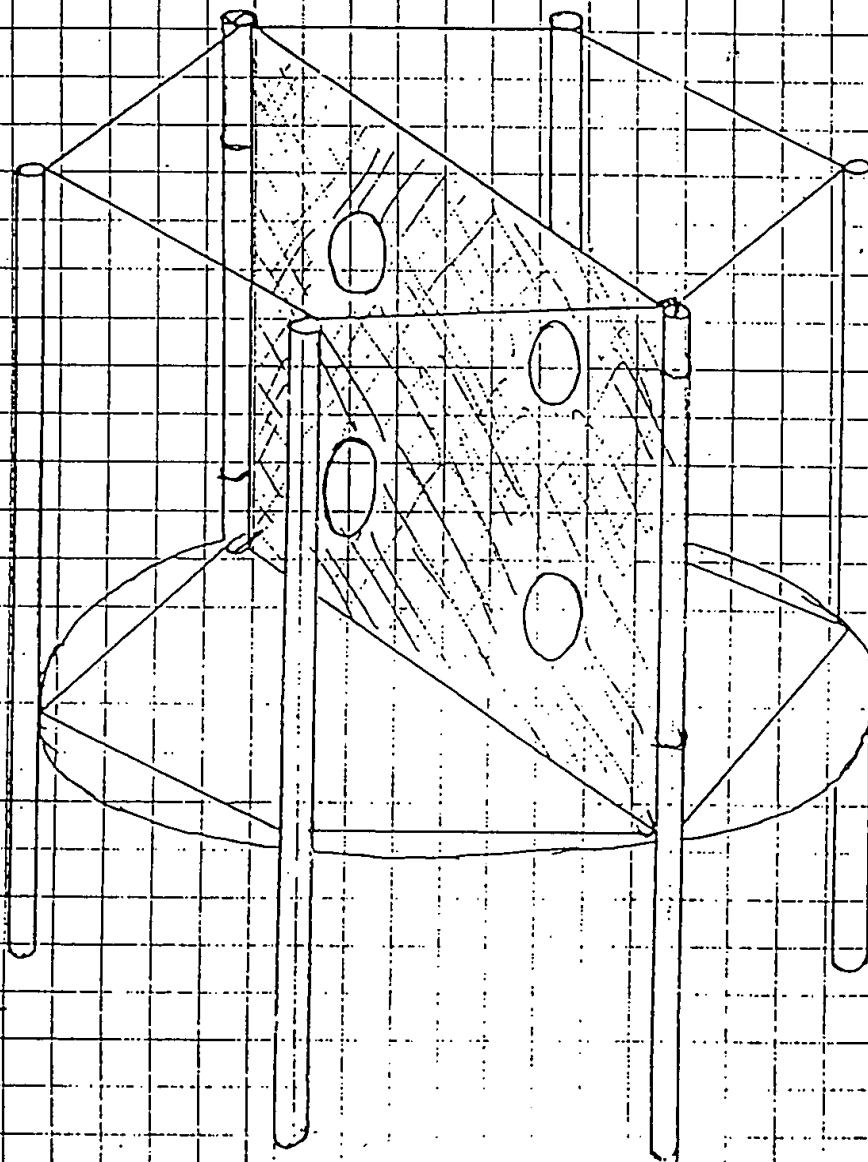


# Tramp Court Game Screen

The Game Screen is an add-on to the tramp court system. It attaches to two opposite support tubes and runs across the diameter of the trampoline, dividing the bed area into two "cells." Any number of holes are made in the screen so that a ball of a given size may pass through.

Drawn:  
Donald Stea

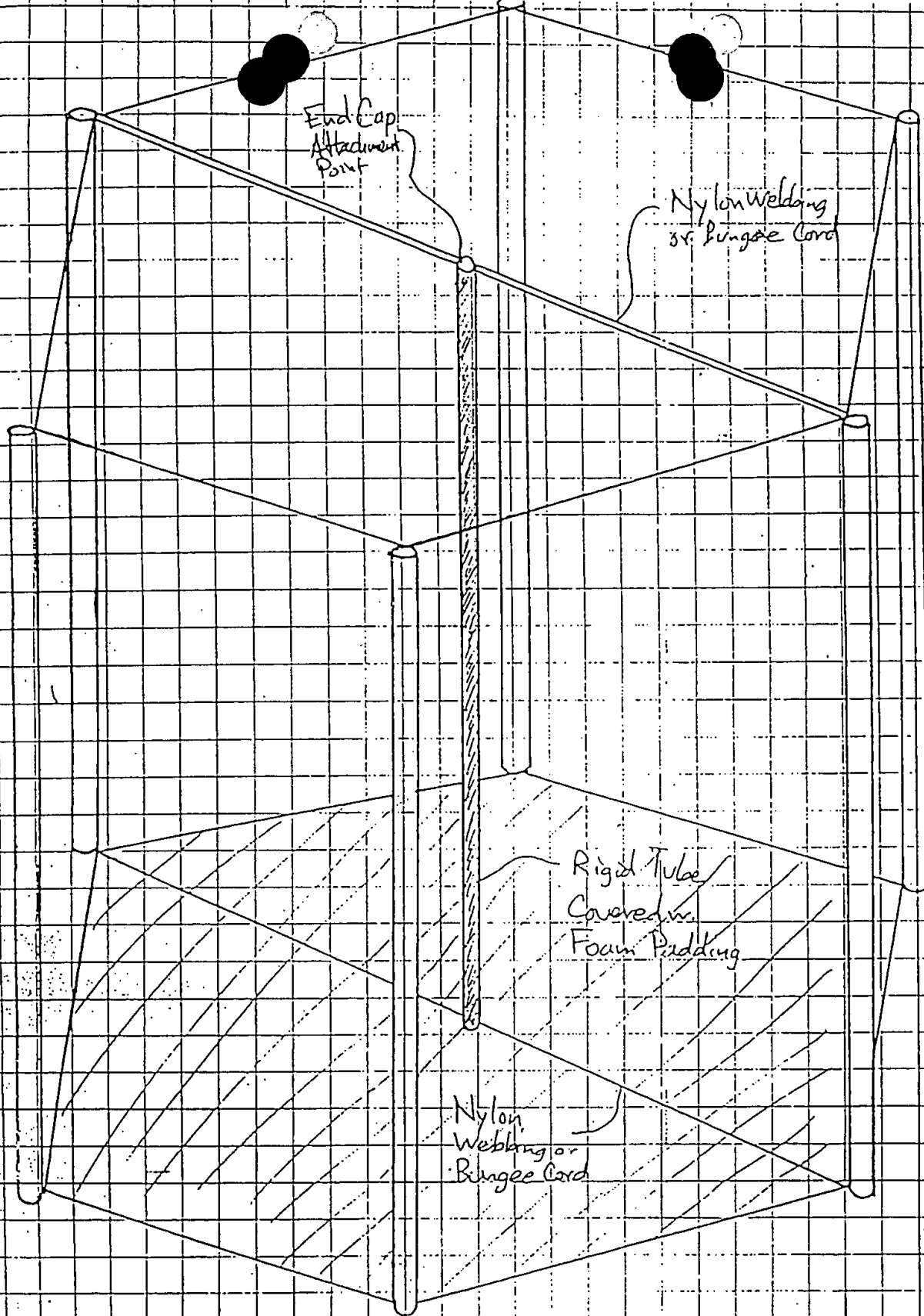
Design:  
Mark Pub



The screen may be made of a mesh, fabric, or plastic sheet and may be transparent, semi-transparent, or opaque. The hooks and bands used to attach it to the poles are either plastic or some type of cord. Games are played using the screen by passing a ball from one "cell" to another through the holes.

Drawn by:  
Donald Ste

Designed by:  
Mark Public  
Donald Ste



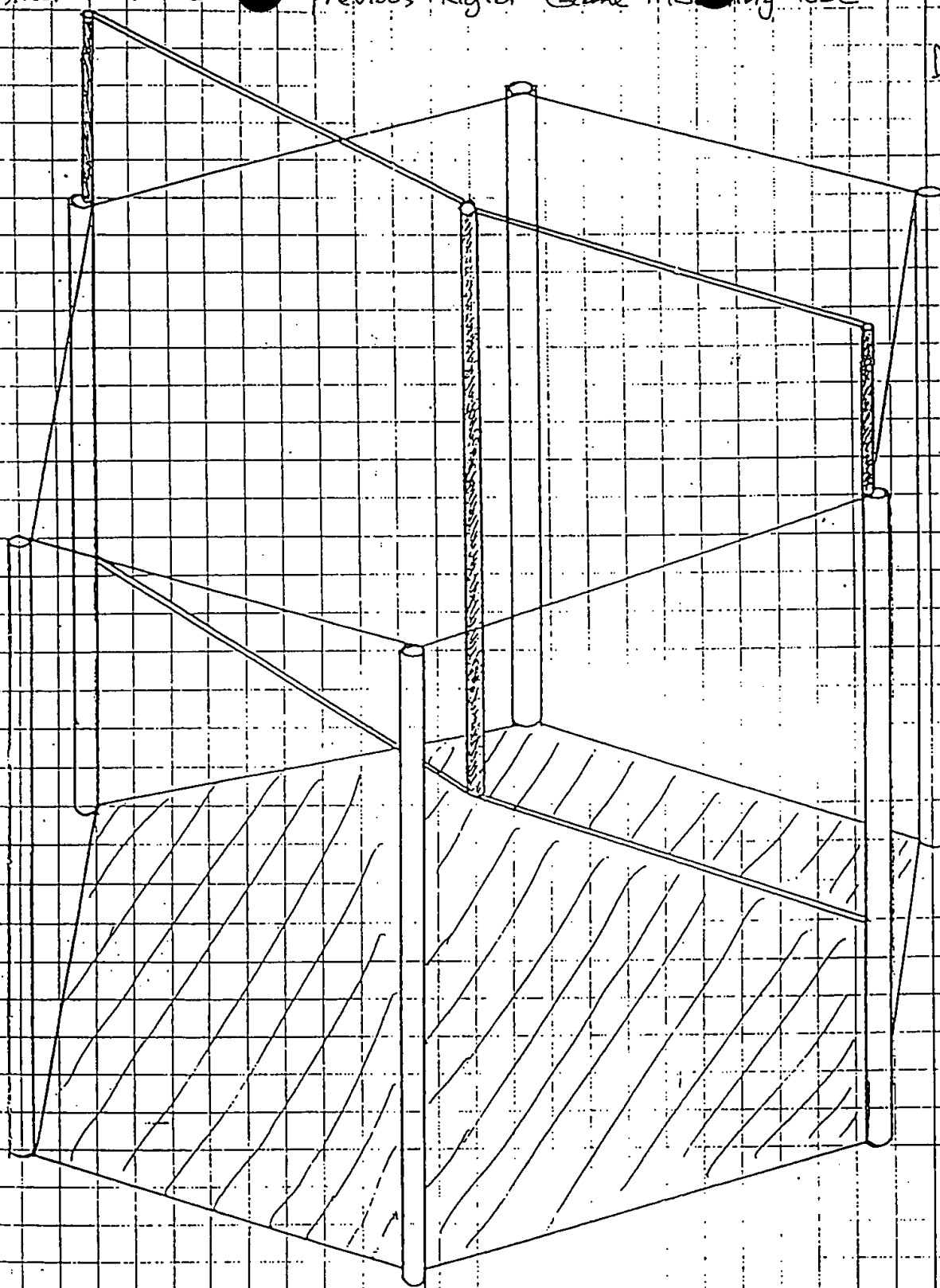
Purpose: To provide a mounting point for various games and play equipment

Materials: The tube is a rigid plastic, covered with a foam padding (probably polyethylene). The end cap is plastic (Nylon, HDPE, etc.) and the top and bottom straps are either nylon webbing or elastic cord.

Purpose: Same as previous Rigid Game Mounting Tube  
Construction: Same as previous Rigid Game Mounting Tube

Drawn by  
Donald Shae

Designed by  
Mark Publico  
Donald Shae



Novel Features: Mounting Tube is suspended above the bed surface so that they do not come into contact. This prevents the pole from moving violently up and down when users bounce on the trampoline.

7/9/97

## Notes from Mark Publicover For the TrampolineCourt

- The width of the candy-stripping straps which wrap around the padding and the poles and engage the bungee cord can increase or decrease the shock absorbing properties of the padding. This is because you are increasing or decreasing the surface area of the strapping. This is one way we can adjust or tune the jump court system to specific weights. You can also do this by using bungee cord with a different diameter to vary the stretch rate. The bungee cord runs from the top of the pole, interlaces the fence, and runs down to the base of the pole. You can also use the bungee cord to actually engage the net and wrap or candy-stripe up the pole, and not use webbing or strapping at all.
- The second thing you can do is to create an enclosure with a more elastic-type configuration. This would be done using netting which is either a diamond shape, or made from nylon cord. Both of these would provide more stretch, giving the enclosure surface better energy absorbing characteristics. This would get rid of the shock absorption afforded by the bungee cord. You could, of course, accommodate the extra elasticity of the nylon cord netting and a diamond pattern, with the bungee cord, and get the same effect by reducing the rigidity of the poles.
- We have considered the different types of poles that could be used. This includes different materials such as graphite-similar to those used in pole vaulting, kevlar, carbon fiber, fiberglass, and different types of plastics. All of these could be incorporated to basically tune the system for different weights and needs.
- There are several different types of bungee cords that may be used. Many different materials may be used for the sheathing, such as nylon, polypropylene, polyester, and other products which could be made to have a high UV resistance and would wear well in the outdoors in a variety of climates.
- The caps at the top of the poles have been designed so that they are rigid enough to prevent somebody from crushing it so that they would run into the tops of the poles. There are several products which could be used for this application. One of the things we could do is to decrease the rigidity and give the homeowner a little tube of foam or some kind of caulking that they would inject into the ball. This could be done either before or after it was installed. We could do that as a second operation or we could actually hand out little balls that could be crushed and pushed in through the neck of the cap. That would add to the ability of the ball to be a little more elastic, and yet still have some mass there to prevent somebody from crushing the cap and hitting the top edge of the pole.
- The caps are currently made of PVC. We can also vary the wall thickness of the cap and go with a 90 durometer and make a thinner wall thickness. We are currently involved in testing whether or not this type of cap would be crushable, yet still stiff enough to prevent somebody impacting the top of the pole from crushing the ball enough to come into contact with the top of the pole. There are hard styrene products



which would also work for this purpose. We are currently researching other materials that would maintain its physical properties over a wide range of temperatures.

- The shock absorption capability of the system can be varied by the density of the foam padding around the poles. There are other products, such as plastic meshes, that have certain shock absorption properties which could be used to wrap the poles. The strapping could then be wrapped around those products.
- There are a number of ways to create the shock absorbtion capabilities that we are looking for. The most important, of course, is to vary the density of the foam being used.
- We have thought about the fact that we could create screw-type clamp-downs that could be used to hold the legs down, in a situation where you do not want the unit sliding or tipping at all. If there are heavyweight people using the unit, we would want some way of holding the legs down. We can accomplish that by attaching a screw-shaped piece of rod into the ground. This has been done for tents, and so forth. It would have a little round piece at the top that would be able to be adjusted and fit over the leg, or clamped to the leg. We could use a pipe clamp, or several different types of clamps. We could just run the screw shape through that and just clamp it down. Another option is to attach a very stiff bungee cord to the leg or to the trampoline bed and screw the screw into the ground. This would relieve tension and yet still serve the purpose of allowing the thing to tip a little bit, without letting it move. Another option is to put the screws inward, and have the bungee cord coming from the trampoline frame down to the screw. This would allow for some limited movement, and prevent any possibility of tipping over.
- The pads that are used on trampolines cover the circular frames of the trampolines and the springs. We have several improvements to the current designs. The foam should fill the entire sleeve that is sewn for the pads. Right now, the foam that manufacturers put in the sleeve is only 8" wide, whereas the sleeve itself is 12" wide. This creates 4" of slop in there, and where the pad can slip in toward the center of the trampoline. This exposes the circular frame of the trampoline. To prevent this from happening, we can use foam which is cut to fit snugly into the sleeve so that there is no room for movement. Secondly, we can use tubular foam padding to go around the circular frame of the trampoline. Most trampoline frames have an outer diameter of 1.92". We can use tubing with an inner diameter larger than that, such as a 3" inner diameter, and split them in half. These can be packaged with PVC tape, which is very weather resistant. This will be color coordinated to match the TrampolineCourt. The foam tubing can be attached to the circular frame of the trampoline by wrapping it with the PVC tape. This idea could be important in marketing our products, allowing the customer to have a safer, or "soft" trampoline.
- Another area for improvement in pad design is the problem of keeping pads in place. We can have each manufacturer make a pad that has holes punched in it, in the area where our court attaches to the legs. This would allow the pads to be pulled down in its proper position. The U-bolts would then be slipped through the holes in the pad skirt. The holes would be punched, and the area around them would be reinforced, so that it was quite strong, and then it would slip down quite nicely over the U-bolts. Then our trampoline pad would be attached to that. Another way to reinforce that area is to stitch in a bungee cord to attach the pad to the trampoline frame. Right now most

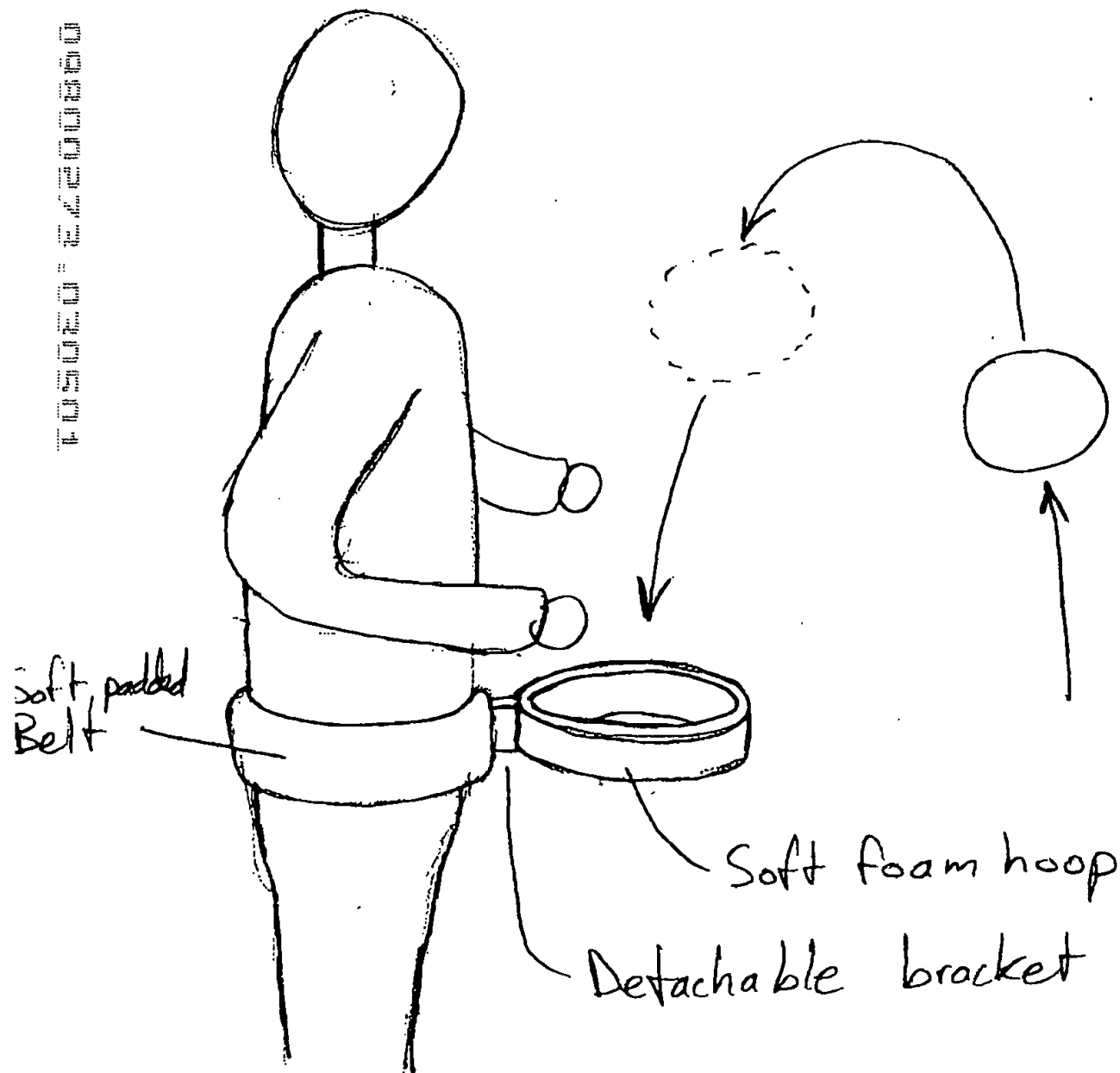
manufacturers stitch nylon webbing to the underside of the pads and have the user tie them around the trampoline frame. The problem with this is that these ties are immovable. When someone lands on the pad hard enough, the pad is pulled inward, away from the frame, and the webbing begins to rip away from the pad. This is a very common problem. Our design is to use an elastic system to attach the pad to the trampoline frame, thereby allowing the pad to move when it is hit, and preventing the attachment points from being ripped away. (Jumpking currently makes a pad with elastic attachment straps which are fastened by a nylon buckle)

- Another improvement to the pad is to use a PVC coating. This would be more expensive, but would hold up at least 3 times as long as the material that they are currently using. We could also use HDPE, or various roofing material such as Duralast as a colorized cover fabric for the padding. Because of its tremendous durability, it would hold up at least 3 times as long as the current materials. An additional idea is to create a cover without padding that we would sell to cover the manufacturer's padding. This would be made out of PVC, HDPE, or Duralast. It would be attached by bungee cords in a Z-type pattern running underneath the frame and springs of the trampoline. You would stitch an attachment point along one side of the cover, and lace underneath the trampoline from the spring-bed connection to the other side, where you would have another connection, and then back and forth around the trampoline. You could have a cord attachment that would run along the outer edge of the trampoline, and pulls together like a draw-string. Then there is an elastic inner connection that runs from the inner edge of the cover to the bed rings of the trampoline. Then you would have a simple cover, without padding, which would prevent deterioration of the manufacturer's pad. This would not have the additional cost of stitching in padding, and all that it entails.

11/05/00 14:00:00

## Hip Hoop

Description - game is played with the "hip hoop" device, and one or more balls. User bounces on surface of trampoline, while attempting to control the bounce of the ball. The goal of the game is to bounce the ball through the hoop.



# Water Jump Rope

Description - Unit sprays moving streams of water across trampoline. User attempts to jump over or duck under spray to avoid getting wet. Motion of the spray is operated by the water pressure from the hose.

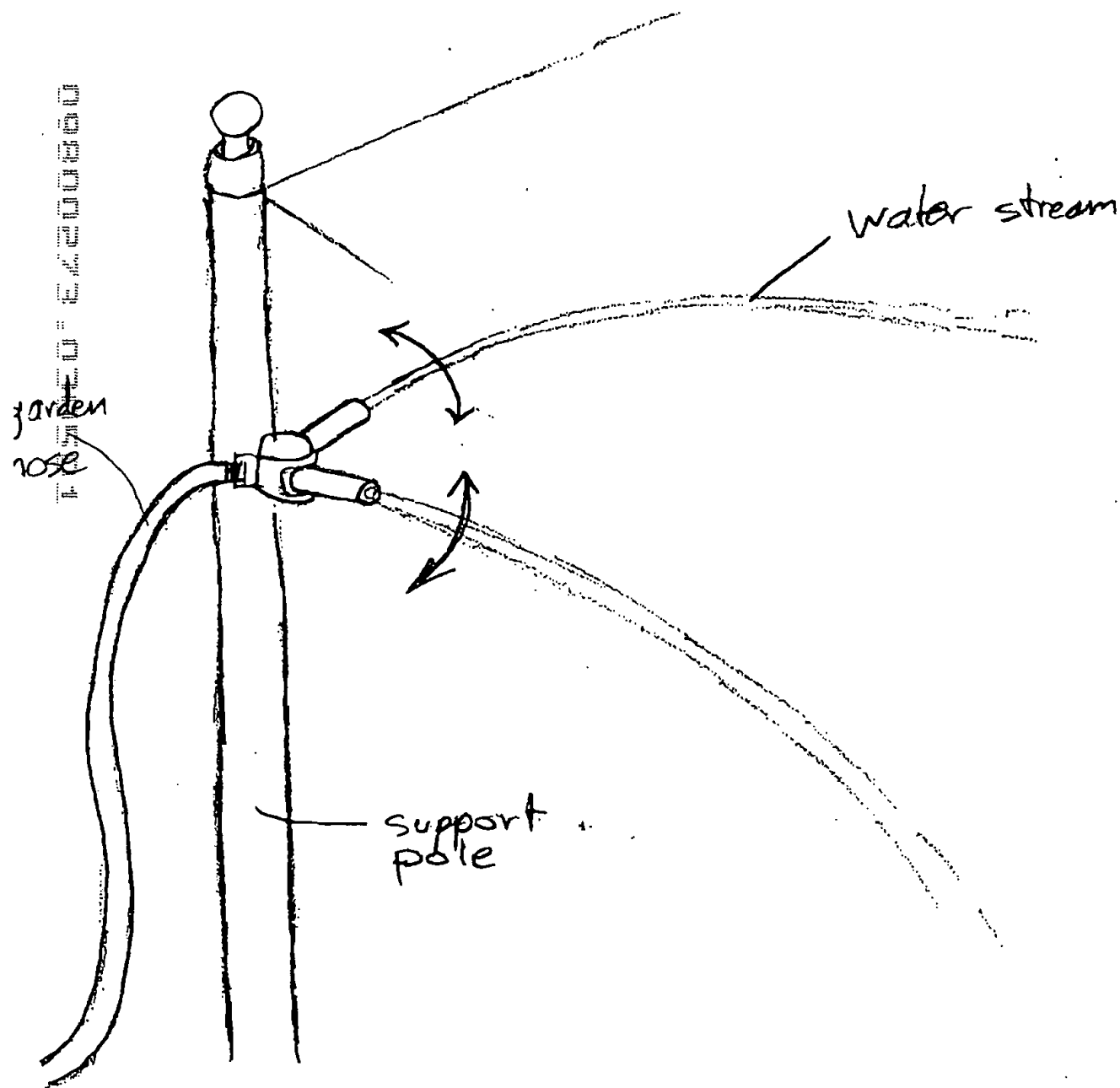
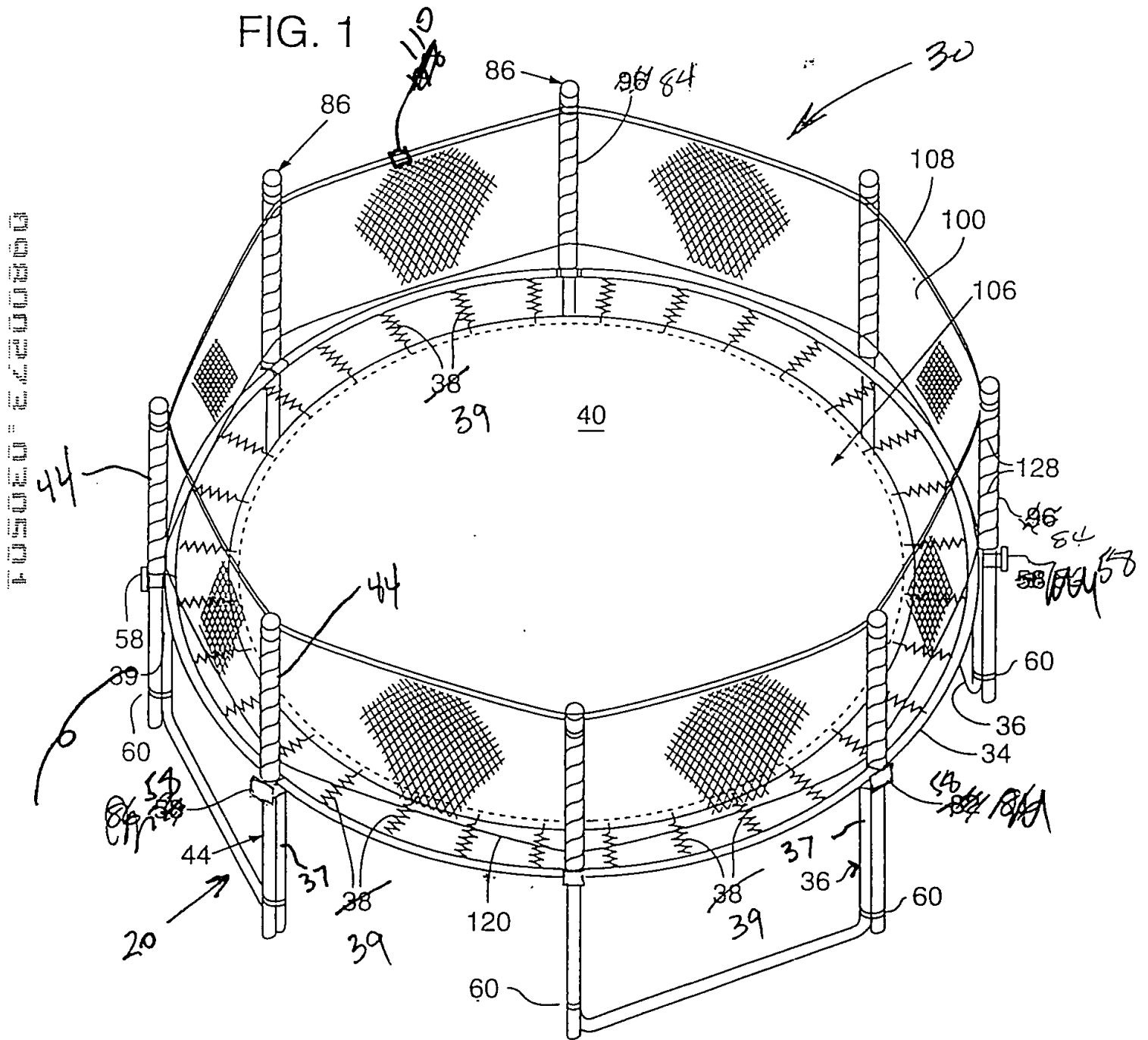


FIG. 1



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FIG. 2

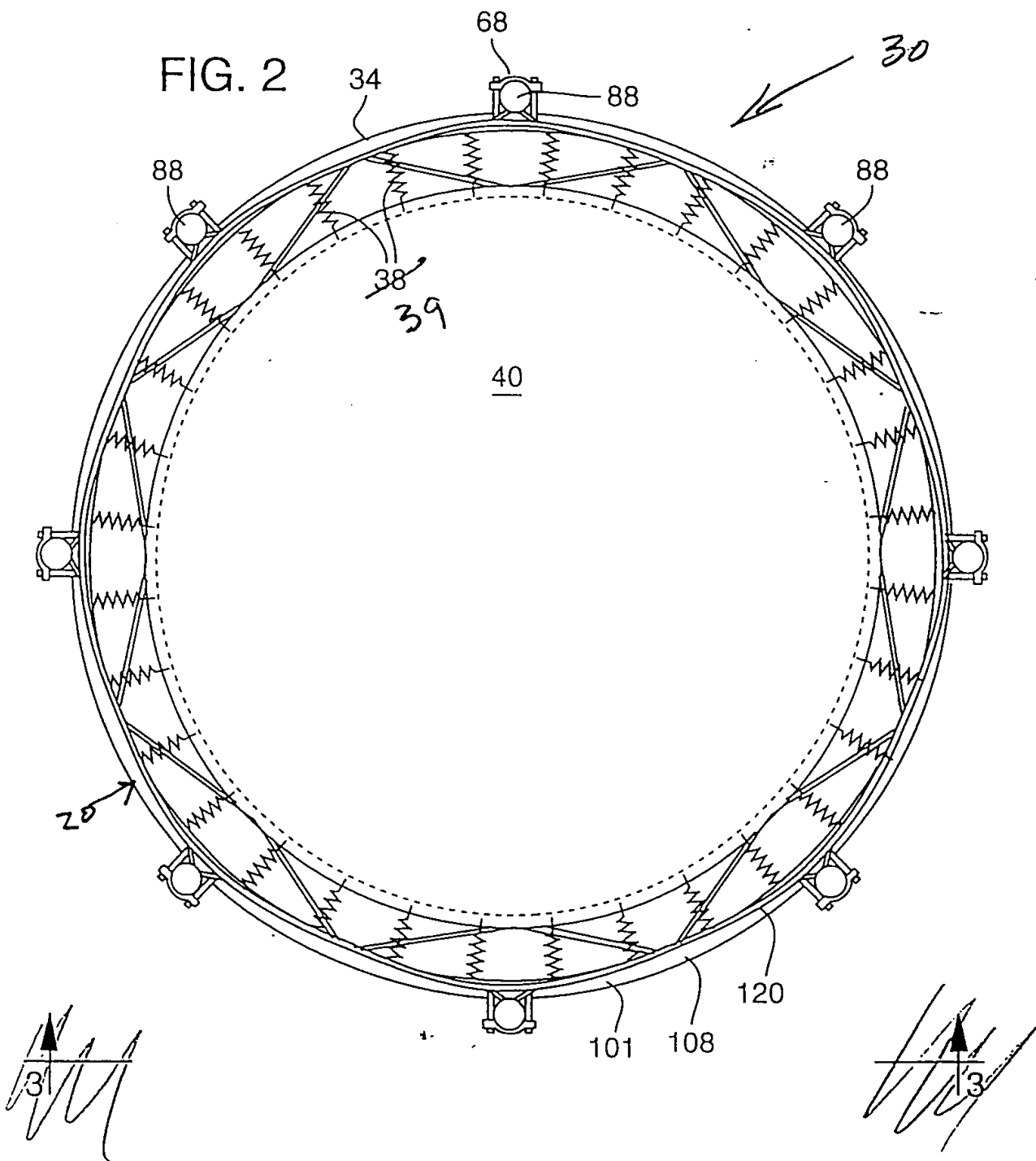
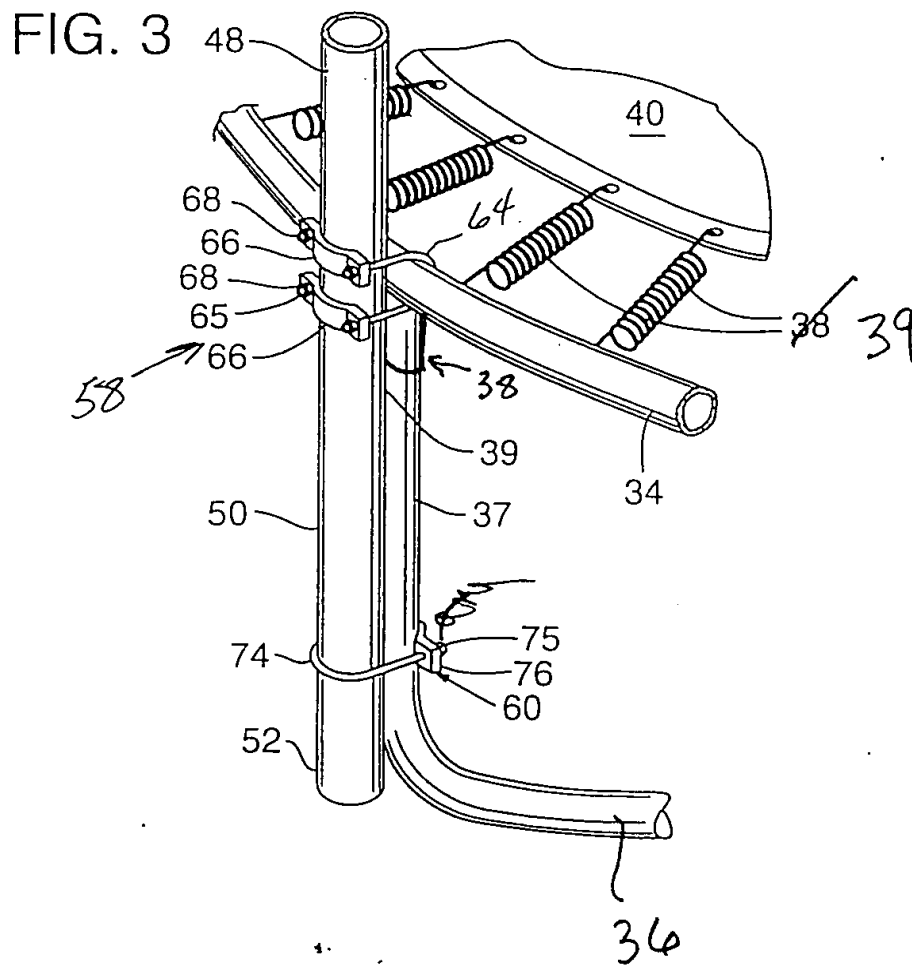


FIG. 3



(38 is swage joint)